COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

New York, September, 1935

Time to Deliver

WAGE NEGOTIATIONS in the Appalachian region will be resumed on September 5. Ever since last February, these conferences have been a series of shadow-boxing in which influential spokesmen for both sides have insisted that no conclusive action could be taken until Congress had passed special legislation for the stabilization of the bituminous-coal industry. Congress has acted. The obligation now rests squarely upon both operators and miners to display that industrial statesmanship which will result in the speedy signing of a new wage agreement which will be fair alike to the industry and to the public and so remove any threat of a fall or winter suspension of mining activities in the soft-coal fields.

Coal Processing

MANY ROADS lead from coal to industrial products, but the best road has yet to be determined and may depend on the product desired. Among these are high- and low-temperature distillation, formation of water- or other gas with the building of compounds by heat, pressure and catalytic agents or by some of these means, cracking and hydrogenation of coal or of the byproducts of high- and low-temperature distillation, flotation of pulverized coal in oil with subsequent distillation, formation of a carbide and thence acetylene—one of the most unsaturated of gases—as a point of approach to an elaborate synthesis, formation of acetylene from methane and manufacture of synthetic material, as with acetylene made by the calcium carbide route.

When coal is ground fine and suspended in oil, it tends to settle, but if it is distilled in suspension it not only gives more low-boiling oils than coal under low-temperature carbonization but the coal thus distilled has a spongy surface and a reduced apparent specific gravity, making the mixture stable without need for stabilizers. Sometimes the particles actually disintegrate and that brings them so near to colloidal dimensions that they float readily.

Keep Them Apart

WHEN LAWS were passed that intakes and return openings be kept a certain distance apart, it probably was fear of fire or failure that influenced the enactment, but today, with high-speed currents entering the mine, the main danger is that air will be sucked from the return into the intake, not only when they are side by side but when they are some distance apart. If quality and not quantity of air is the criterion of the operator—and it should be—it will be profitable for him to keep the two as far apart as possible and on no pretext have intake and return in a single shaft. Both safety and economy demand this provision.

Coal a Nitrogenizer

JUST to what extent coal is a real plant food has been questioned. Some contend that it contains little or nothing that will enter into the plant substance, but, nevertheless, it may be helpful chemically, for it may act as a catalyst provoking chemical action that will aid plant life, and it may promote growth of bacteria that will have the same effect or actually take nitrogen from the air.

In this connection it may be recalled that Lieske and Winzer, of the Kaiser Wilhelm Institute, took a kilogram of dry, loamy soil and found that in three months it gained only 130 milligrams of nitrogen, but when it was mixed with 4 per cent of dry Fortuna lignite it gained 350 milligrams. When other loamy soil was inclosed in a tight container, the air over the seal showed a gain in nitrogen of 31 cubic centi-

meters after several weeks, but when 5 per cent of Zielenzig lignite was added to the natural soil, the air lost 35 cubic centimeters of nitrogen, which suggests that with the unmixed soil—which was presumably relatively sterile, though Lieske does not actually say so—the denitrifying bacteria removed nitrogen from the soil and put it in the air, whereas with soil mixed with lignite the nitrifying bacteria took nitrogen from the air and stored it in the soil.

Dr. Lieske and Gregorio Rocasolano, of Saragossa, Spain, believe that only when humic acid is present can nitrifying bacteria act to add nitrogen to the soil. Dr. Lieske declares that lignite exerts a great influence on the nitrogen "bilanz," or assets, of the soil.

Another Chapter

WITH THE ENACTMENT of the Bituminous Coal Conservation Act of 1935, the soft-coal industry enters upon another phase of the experiment in stabilization through federal regulation which started with NRA. That, under the present organization and economic position of the industry, some positive action to prevent a return of the conditions which prevailed in the years immediately preceding the promulgation of the bituminous-coal code is highly desirable hardly seems debatable. The drift back to precode profitless prices and practices which began some months ago has become too pronounced for comfort.

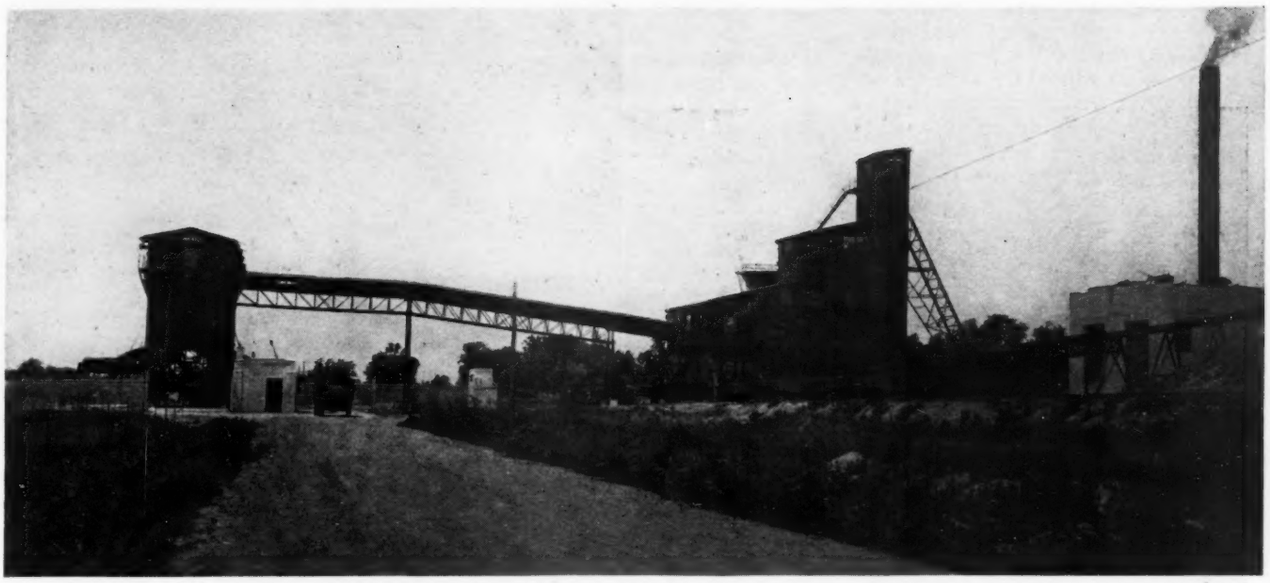
Whether the new law, if it survives constitutional challenges, will accomplish all in the way of rehabilitation that its sponsors claim for it time alone can determine. Although the act passed last month is a marked improvement over the measure which first made its bow as the Guffey-Snyder bill, it is still far from a perfect instrument. Allocation, fortunately, fell by the wayside early in the many revisions of the bill; the final modifications in committee eliminated both the bizarre proposal to deny non-code producers access to the mails and the plan to use the credit of the federal government to buy up marginal mines and undeveloped coal lands.

To many the minimum-price areas and the formulas for arriving at minimum prices are still complicated and fearsome things. The apparent straining to be so specific in laying down rules which would dodge court condemnation as a blanket surrender of Congressional authority suggests confusion rather than clarification. There is the saving implication in these provisions, however, that the Coal Commission may ignore or modify some of the specifications if such action is deemed necessary to effectuate the underlying purposes of the act. The domiciling of two presumably independent agencies in existing government departments does not seem a happy solution.

Because so much honest difference of opinion has developed on the question of the constitutionality of this expansion of government control into the field of what heretofore has been regarded as purely private industry, it is regrettable that Congress did not so frame the act that a clear-cut decision on this issue would have been inescapable. Either the power to regulate the coal-mining industry exists in Congress or it does not. By using the taxing power to force producers to subscribe to a control system alleged to be voluntary the way is left open for a possibly adverse decision which would leave the main question untouched.

Assuming, however, that the constitutional hurdles can be cleared, defects of detail which the act may contain are susceptible to later modification. Experience in administration doubtless will demonstrate the wisdom of certain changes and may even make some provisions which now appear objectionable actually advantageous. That has been the history in federal railroad regulation; there is no reason to believe that it will be materially different in coal. The statutory declaration of expiration of the act in four years may be dismissed as a well-meant pleasantry: if the principle of control is validated by the Supreme Court, a return to private status by the industry will not be easy.

The greatest danger in regulation is the subtle sapping of initiative and the growth of a feeling that the government must shield a controlled industry from the onslaughts of competition and changing public tastes. But, if coal producers will still hold fast to the truths that they alone can successfully fight their own battles and that no government regulation can long protect inefficiency, then enactment of the Bituminous Coal Conservation Act of 1935 should make possible greater stability, more intensive modernization in the interests of lower production costs and more adequate returns to the capital and the labor employed in this essential industry.



Big Chief No. 10 Surface Plant. Truck-Loading Plant and Scale House Are at the Left, Tipple and Washery in Center and Power Plant at Right. Mine Offices and Shops (Not Shown) Are Behind the Power Plant.

BIG CHIEF No. 10

+ Adds 1,200 Tons of Daily Output

To Michigan Production Roll

OPENED in 1934, Big Chief No. 10 mine of the Robert Gage Coal Co., Unionville, Mich., is one of the two new operations added to the list of Michigan producers in that year. Designed for an average output of 1,200 tons in seven hours, the mine was equipped with a three-track tipple, a washing plant for slack with provisions for washing egg also, if desired, a retail truck-loading station for the three primary sizes and a power plant operating on raw 1¼-in. slack.

Big Chief No. 10 is approximately 30 miles east of Bay City, Mich., in Tuscola County, and is served by the Pere Marquette R.R. The coal is thought to be the lower seam of the Michigan series, but differs substantially from other Michigan coals in that it is of a pronounced splinty nature. Thickness of the seam varies from 30 to 60 in. and averages 43 in. It is reached by a 9x14-ft. timbered shaft with a total depth of 214 ft. Depth to the bottom of the seam is 204 ft. An 8x10-ft. timbered air shaft with stair compartment is sunk 350 ft. northwest of the hoisting shaft.

The bottom generally consists of a variable thickness of fireclay, which occasionally cuts out, leaving a sandy shale. Although missing entirely in places, a layer of "blackjack" varying up to 4 in. in thickness generally occurs in the bottom of the seam. As undercutting is the standard practice, this material, as well as fireclay, in case the machine gets down into it, shows up in the screenings, and this condition was the principal factor in the adoption of wet washing for the minus 2-in. size. A layer of dirty coal up to 7 in. in thickness also appears in the top of the seam over certain areas. This is left in place, where possible, and makes a hard, strong roof.

Immediately over the seam is a 0- to 12-ft. stratum of gray slate varying from good to bad from the standpoint of its characteristics as a roof. Over this gray slate is a rotten gray shale. Clay veins frequently are encountered in the seam, and in this case the gray slate generally is missing and the shale comes down directly over the coal. Other impurities in the seam consist largely of sulphur balls, which are picked out by the miner; granular sulphur; and calcite. One characteristic of the coal is that, in spite of the presence of the sulphur, it stocks well.

The coal at No. 10 occurs in a long, relatively narrow body and is being developed by main entries running roughly north and south from the shaft bottom. In a few instances, it is expected that cross entries will be driven, but in general the working sections will consist of room entries turned off the main entries (Fig. 1) and worked on the advance to the boundary of the coal area.

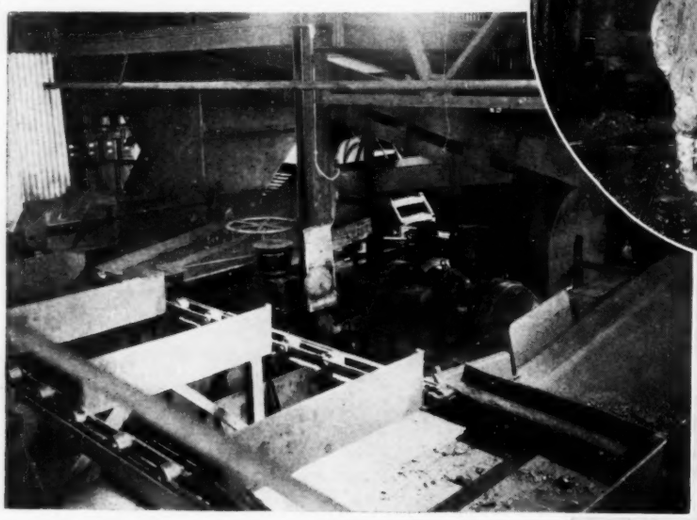
Main entries are made up of two headings driven 5 ft. wide on 32-ft. centers with breakthroughs every 60 ft. Track consisting of 35-lb. rail on 4x6-in. wood ties 5 ft. long is laid in both entries with crossovers every 300 to 600 ft. One track is for outgoing loads and the other for incoming empties. Track gage is 36 in. Because of the nature of the roof, main entries are timbered with crossbars of 35- to 60-lb. rails hitched into the rib on 4-ft. centers.

Hitches generally are cut with a Goodman hitch drill and the crossbars are wedged in place. Hand-cutting of hitches is practiced to some extent, but

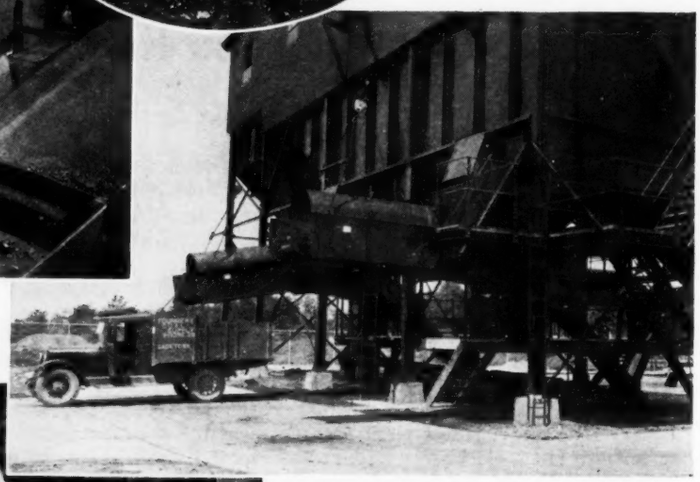
Main Entries Are Timbered With Steel Rails Using a Hitch Drill. Bottom Is Lifted for Height.

Working Face in Heading Being Driven in the Solid.

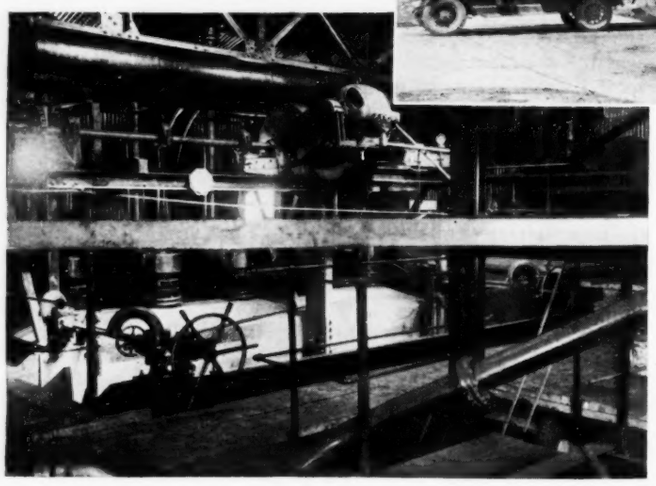
Shaft Bottom, With Car of Coal on Cage.



Mine-Run Screens and Shaking Picking Tables in Big Chief Preparation Plant. Surge Bin and Feeder for Screenings Appear at Extreme Left.



Close-Up of Truck-Loading Bins and Booms. Two Additional Booms and a Screenings Chute on Opposite Side Give Five Loading Points.



Screenings Are Cleaned in This Five-Cell Washer at Big Chief Mine.

drilling is preferred because the hardness of the coal adds to the time and cost of hand work. Permanent timbering with hitches and crossbars is kept up to within 50 to 100 ft. of the faces as the entry advances; permanent track to within 50 to 300 ft. Standards call for a minimum clear height of 5 ft. over the top of the rails and under the crossbars on main entries, which is obtained by lifting bottom as necessary. Waste material resulting from the latter operation is sent to the surface for disposal.

To eliminate the expense of hauling, hoisting and disposing of bottom material, room headings are driven 16 ft. wide with a 5-ft. roadway on the side next to the rooms. Material gained in the bottom lifting is gobbed on the 11-ft. bench left on the opposite side of the heading from the roadways (Fig. 2). Sights for "gob headings" are carried 18 in. from the right or left rib, as the case may be, and the right or left rail of the track is laid on the sight line.

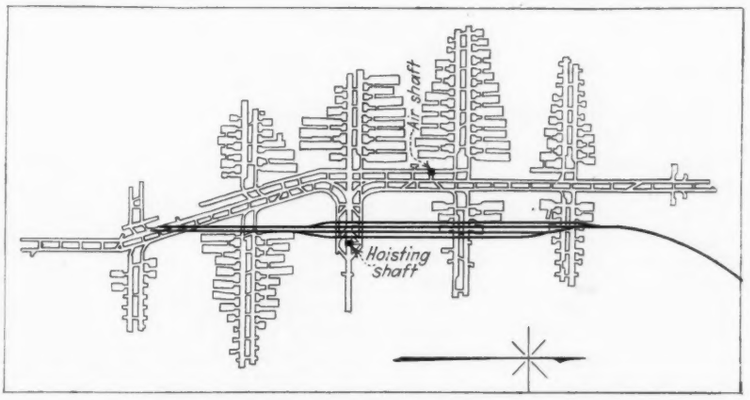


Fig. 1—General Plan of Development, Big Chief No. 10 Mine.

Timbering in gob entries is based on the use of crossbars and individual round posts. Crossbars on 4-ft. centers are installed over the roadway, one end resting in a hitch in the rib and the other on a "road prop" set next to the bench on the opposite side of the track. In addition, two rows of split props are set on the bench (Fig. 2) and the gob is deposited around them. Roadway crossbars consist of 3x8-in. sawed timbers approximately 7 ft. long. If additional strength is required, two bars or a rail are used. In timbering past room necks, one end of the roadway crossbars is supported on a 4½x8-in. wood crossbar set across the neck with one end in a hitch and the other on a post. A minimum clear height of 4½ ft. is maintained in gob headings. These headings and also the rooms are laid with 20-lb. rails on 3x5-in. wood ties 5 ft. long. Room turnouts are laid with No. 7 frogs.

Rooms are necked and driven as the gob entries advance. Room depth is 150 ft.; width, 24 to 30 ft.; centers, 36 ft. Rooms are necked 10 to 12 ft. wide, and widening starts about 15 ft. in and is completed by the time the first breakthrough—30 ft. from the heading—is driven. Crossbars are seldom used in rooms, timbering consisting of two rows of road posts set at the ends of the ties (Fig. 2) and generally one, sometimes two, rows of posts on the bench on either side of the 5-ft. roadway, which is located in the center of the place. A minimum clear height of 4 ft. is maintained along room roadways, and the gob made in lifting bottom for this purpose is deposited on either side of the place.

As hereinbefore indicated, rooms are worked on the advance. As soon as they are completed, the stumps are removed, starting at the inner end of the entry, which is then abandoned. Under the No. 10 set-up, each miner has entire charge of his place and, in addition to drilling, shooting and loading, takes up bottom for the roadway, lays track, sets timber and trams empty and loaded cars back and forth between the mouth of the room and the face. Three holes, drilled in the top of the cut and loaded with an average of 4½ sticks of duPont pellet powder (two sticks in each rib and ½ stick in the center), are used in blasting down a cut in rooms. Contrary to general practice, shooting rib holes first has been found to give better coal at No. 10. Cutting machines for the normal daily output of 1,200 tons number twelve—all Goodman with 6-ft. cutter bars and 35-hp. motors.

Locomotives for a 1,200-ton output number eight, as follows: Jeffrey, 2; Goodman, 6, all of the trolley and cable-reel type rated at 6 tons. All locomotives haul to the shaft bottom, where caging is accomplished by a Nolan automatic cager. Average loading of the wooden mine cars in use is 2,400 lb., with the maximum running up to 3,600 lb. Height of the cars is 32 in.; wheelbase, 18 in.; wheel diameter, 12 in. Wheels are fitted with Detroit roller bearings.

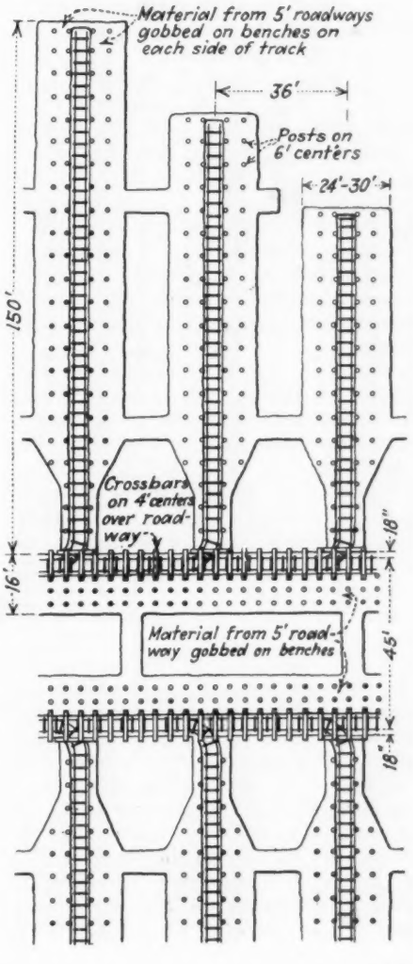
Pumping required is handled by a Dean 8x8-in. triplex pump stationed at the shaft bottom and discharging to the surface. A similar unit is kept in reserve. Air is supplied by a 16x3-ft. steel paddle fan with a maximum capacity of 40,000 c.f.m. mounted over the air shaft in a brick fan house.

The hoist at No. 10 consists of a straight cylindrical drum with a diameter of 5 ft. driven by opposed 20x40-in. steam engines. Hoisting rope diameter is 1¼ in., and the hoist has a maximum capacity of 5 cars per minute, using Russell self-dumping cages.

Primary sizes made in the preparation plant, designed and built by the Link-Belt Co., are raw 4-in. lump, raw 4x2-in. egg, and washed 2-in. screenings. Provision is made, however, for washing all coal from 4 in. down when desired; for loading screenings raw; for loading cleaned mine-run or mixtures of any two of the three primary sizes; and for crushing lump and egg to a maximum of 4 and a minimum of 2 in., the crusher discharging directly to the car.

From the cars the coal flows into a chute equipped with a flygate for diverting rock to the refuse bin. Each carload is weighed separately in a 3-ton gravity-operated weigh hopper, weights being ascertained with a 10-ton Fairbanks scale equipped with beam and

Fig. 2—Plan View Showing Roadways, Track and Timbering in Gob Headings and Rooms.



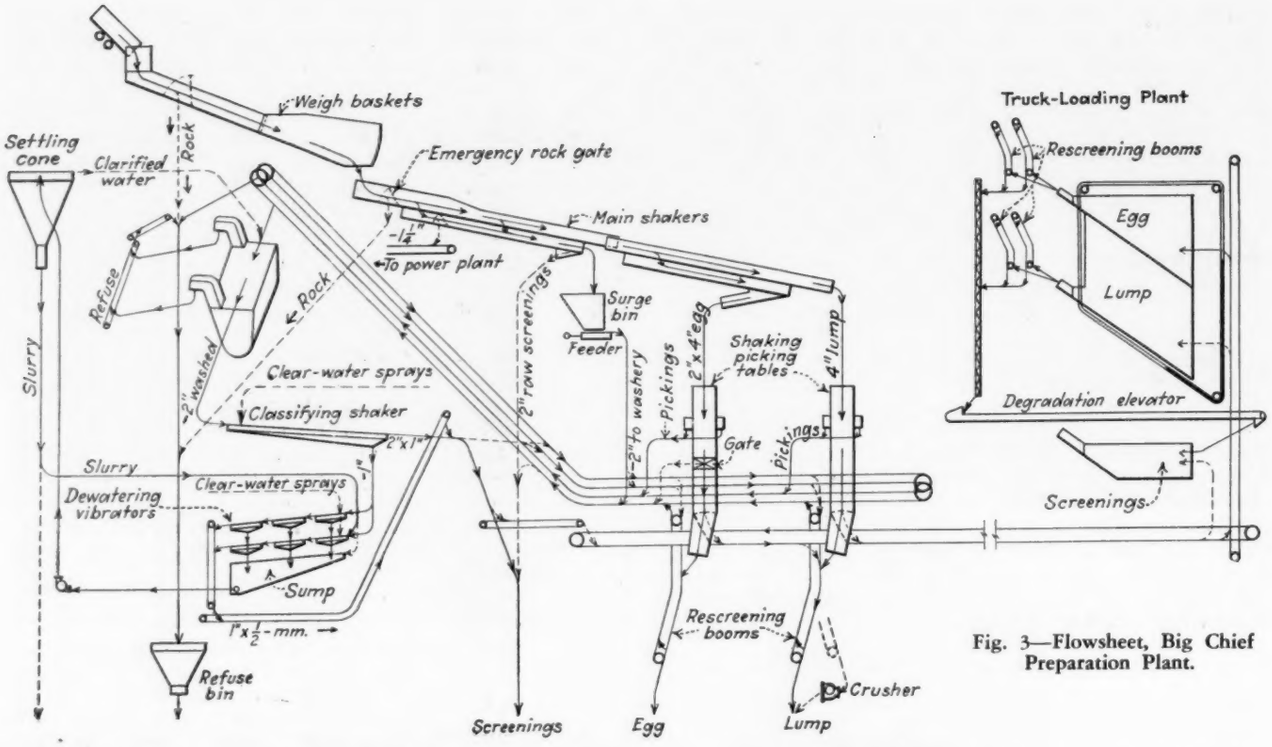


Fig. 3—Flowsheet, Big Chief Preparation Plant.

quick-reading dial. Coal is discharged directly onto the upper end of a set of steel-hanger shakers 6 ft. wide. An emergency gate is provided in the upper shaker to allow rock accidentally dumped into the weigh hopper to be diverted to the refuse bin.

The upper screen is equipped with 16 ft. of 2-in. round perforations for separating out the 2-in. screenings, which may be loaded raw through a chute over the slack track but generally are chuted to a surge bin equipped with an automatic reciprocating feeder discharging the coal into the degradation compartment on the lower run of the two-compartment degradation and refuse conveyor for transportation to the washer.

Plus 2-in. coal is separated into 4-in. lump and 4x2-in. egg on an 8-ft. long lip-screen section on the lower shaker. Each size is delivered to a shaking picking table 4 ft. wide and 19 ft. long. Pickings drop into the refuse compartment on the lower run of the degradation and refuse conveyor for transportation to the refuse hopper. Picked coal goes either to the 36-in.-wide Link-Belt patented rescreening loading booms, one for each size, or is diverted by gates on the discharge ends of the tables onto the bottom run of a double-strand chain-and-flight-type conveyor for transportation to the retail truck-loading plant. The egg table also is fitted with an auxiliary gate to allow this size to be diverted to the conveyor feeding the washer. Degradation removed on the booms is returned on the lower strands of the boom conveyors to the degradation compartment of the degradation and refuse conveyor for transportation to the slack-loading station or the washer. The crushing installation noted above is placed at the end of the lump boom, from which it receives either lump or lump and egg for reduction prior to loading.

Screenings are washed in a 5-cell Link-Belt Simon-Carves washer with a capacity of 100 tons per hour. Refuse from the washer goes by a series of chain-and-flight conveyors to the refuse bin adjacent to the shaft. Washed coal flows with the water to washed-coal sizing shakers, where it is separated into 2x1- and 1x0-in. sizes, the former generally going directly to a chute leading to the screenings track, although it can be diverted to the top strand of the degradation and refuse conveyor for return to the tipple for mixing, or onto a short transfer conveyor discharging onto the chain-and-flight conveyor to the truck-loading station.

Minus 1-in. coal and water through the washed-coal sizing shaker flows to a battery of six Link-Belt vibrating dewatering screens installed in two groups of three each in series. The vibrators are equipped with transverse wedge-wire sieves with ½-mm. openings. Water and fine coal through these screens flows into a sheet-steel sump, from which it is pumped to a 40-ft.-diameter settling cone. Clarified water from the top of the settling cone is recirculated to the washer. Thickened material settling to the bottom of the cone generally is recirculated to one of the two sets of dewatering vibrators for rescreening, any excess overflowing to the sump. Clear water for make-up is added to the system through sprays on the washed-coal sizing and dewatering screens.

The No. 10 truck-loading station consists of two 100-ton bins for lump and egg, a 50-ton bin for screenings (and degradation from the truck-loading booms) and the necessary distributing equipment, loading booms and chutes. Screenings brought to the station drop through a gate in the conveyor into a chute leading directly to the screenings bin, which is equipped with one chute for loading. Egg and lump are discharged into a distributing conveyor for disposal in their respective bins. The bottom of the distributing conveyor consists of a flat apron extending partially around a double chain encircling the two bins. This flat apron trough bottom is movable in either direction, and when loading of either of the two bins starts is positioned at the edge of the bin where filling begins. As the coal builds up, the flat apron bottom is moved forward gradually, thus reducing the drop of the coal to a gentle roll and thereby the degradation.

The lump and egg bins are each provided with two patented rescreening loading booms, one on each side. Degradation is returned on the lower flights of these booms to a screw conveyor. The screw conveyor discharges into an elevator which deposits the degradation in the screenings bin. Trucks are weighed on 25-ton Fairbanks scales with automatic tare-setting features and a quick-reading dial. A smaller beam scale is provided for emergency use.

The No. 10 power plant is equipped with two used B. & W. Stirling boilers rated at 570 hp. each. These boilers

(Turn to page 376)

OMAR POWER PLANT

+ Expected to Return Investment Cost In Four to Five Years

By J. H. EDWARDS
Associate Editor, Coal Age

Outside Breechings Permit Simple, Continuous Hip-Roof Design. Between the Building and the Cooling Tower Back of It Are the Concrete Water-Storage Basins.

SAVINGS accruing at the present rate will return the new power-plant investment of the West Virginia Coal & Coke Corporation in four to five years, according to John C. Cosgrove, president. This plant, located on Island Creek and on a spur of the Chesapeake & Ohio Ry. at the mouth of Chauncey Hollow about one mile from Omar, W. Va., was put into operation last February and supplies all seven mines of the Logan County division, including the Earling mine, which is served by a seven-mile transmission line.

Monthly saving is calculated as the difference between operating cost and the estimated net bill for an equivalent amount of power if purchased from the utility company at the rate being charged when that service was discontinued. The fuel item of operating cost is small because with normal mine production laminated coal and bone pickings from the tipples of three near-by mines together with minus 20-mesh coal from a dedusting screen is sufficient to fire the boilers.

Formerly there were times when a considerable percentage of this laminated coal, which carries 10 to 11 per cent ash and comes from a stratum occurring at the top of the seam, was discarded to the refuse dumps. The trucking charge over distances of one to three miles by concrete roads to the plant adds but little to the former disposal cost, part of which was a trucking charge. The average ash of the refuse fuel being burned in the plant is approximately 16 per cent. Marketable coal can be brought in by rail if the quantity of trucked refuse falls short of meeting the power-plant demand.

Water supply was the problem which delayed for several years the construction of a power plant. Discharges from mine drainage make the abundant waters of Island Creek unsuitable for boiler use, and to locate the plant at Earling, on the Guyandotte River, was undesirable because that mine is a leased property and is seven miles from the center of distribution of the other mines. Monthly power bills of $10,000 to $13,000 at reduced operating schedules, however, spurred the company executives to investigate every possibility, with the result that it was finally determined that, by designing a plant economical in the use of water, the limited flow of Middle Fork (which is not contaminated) would, if impounded by a dam, provide sufficient water except during extremely dry seasons. Drillings near the proposed plant site succeeded in locating two deep wells each of which will provide about 100 g.p.m. for supplementing the creek supply.

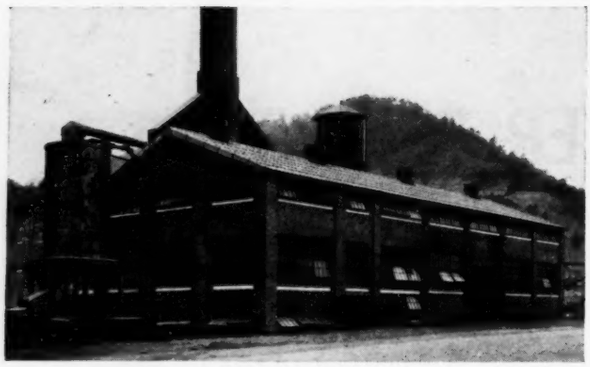
Because the low fuel cost minimizes the importance of high thermal efficiency, reconditioned turbo-generators and some reconditioned auxiliaries were installed; the boilers, stokers, and numerous other items, however, are brand new. Turbo-generator equipment consists of one 3,000-kw. General Electric 1,800-r.p.m. 0.8-power-factor unit and one 4,000-kw. Westinghouse 3,600-r.p.m. 0.8-power-factor unit, both arranged for condensing operation. Steam-generating equipment consists of two Union Works type N water-tube boilers equipped with Firite spreader-type stokers. Each boiler has 5,000 sq.ft. of heating surface, therefore has a nominal rating of 500 hp.; however, the specified capacity is 35,000 lb. of steam per hour (continuous) and 43,000 lb. per hour (maximum) for four-hour periods.

The 3,000-kw. generator has sufficient capacity for present demands. The 4,000-kw. unit serves as a spare but can be made the "regular" unit and the other the spare if the load is increased to that demand. Both boilers must be operated for normal loads, but one boiler will carry the week-end load, thus releasing the other for maintenance. The building can be extended and additional boiler capacity installed later if conditions demand.

Boilers are designed for 250 lb. pressure and are operated at 215 lb. and at 100 deg. superheat with a resultant total temperature of approximately 500 deg. F. Settings are all-firebrick construction with water-cooled bridge walls and the built-in equipment includes Bayer soot blowers. Firite stokers have three spreader units per boiler and grates are the dumping type. The spreader-type stoker was selected because of its apparent ability to burn coals of widely varying physical and chemical qualities. Fine coal from the dedusting plant has a strong caking characteristic and the coarse bony refuse has an ash-fusion temperature of 2,000 deg. F. or lower.

Circulating water for the surface condensers of main generating units is cooled in a 6,500-g.p.m. Lillie-Hoffmann forced-draft cypress tower consisting of four sections and equipped with eight propeller-type blowers each powered by a 15-hp. Westinghouse 220-volt 700-r.p.m. induction motor. Between the cooling tower and the power house is a 280,000-gal. concrete basin for circulating water and another of 8,000 gal. capacity for treated water to be used as boiler feed. The power-house foundation and basement wall of one side forms one wall of the water-storage basins.

Coal is received either by truck or railway car and the one track hopper serves both methods of delivery. Preparation and handling equipment consists of a plate feeder, a Jeffrey single-roll crusher driven by a Westinghouse 20-hp. type CS motor, short screw conveyor, bucket elevator, and a flight conveyor above the bunker. Sixty tons is the bunker capacity and the construction is steel, catenary design, and totally in-



Steam Transports the Ash to the Round Dust-proof Bin, Which Is Vented to the Stack

closed to confine dust. To further minimize dust escape from the bunker a small fan maintains a slight negative pressure in the bunker and delivers its air and any dust to the furnace of one boiler through a 4-in. pipe with the outlet located in the front wall just below the stoker. A similar blower with suction connected to the coal elevator discharges into the other furnace.

Although the stoker was designed for minus ¾-in. size, the fuel now being used is crushed to only 1½ in., yet is handled satisfactorily. Minus 20-mesh dust alone cannot be used as fuel because chutes are not designed to handle that size without clogging. No fuel scale is provided because a check of plant efficiency is of slight importance due to the low fuel cost; moreover, it would be difficult to determine the average heating value of the various grades of fuel used in a month. The coal crusher is under the track hopper in a separate room accessible from the firing aisle but closed therefrom by a door to keep dust out of the main building.

Natural draft is provided by a self-supporting steel stack 8 ft. in diameter by 150 ft. high above outlet dampers. It rests on the steelwork of the building and boilers and has a conical bottom from which a pipe leads to an intake of the steam-jet ash conveyor. Three times per day the fly-ash accumulation from the rear of the boilers and the stack is drawn off through the pipe. Automatic control of stack dampers in relation to steam pressure is effected by a Carrick regulator.

Forced draft for each boiler is furnished by a Clarage fan driven by a Moore steam turbine. Speeds of the fan turbines are varied according to steam pressure by a second Carrick regulator which also starts and stops the stoker motors. Boiler-feed equipment consists of two Manistee 4-stage 250-g.p.m. 640-ft.-head centrifugal pumps, each powered by a Moore turbine. Water level in the boilers is regulated automatically by Copes equipment. Turbines of the feed-water pumps and blowers exhaust into a Cochrane open-type de-aerating feed-water heater with vent condenser on top.

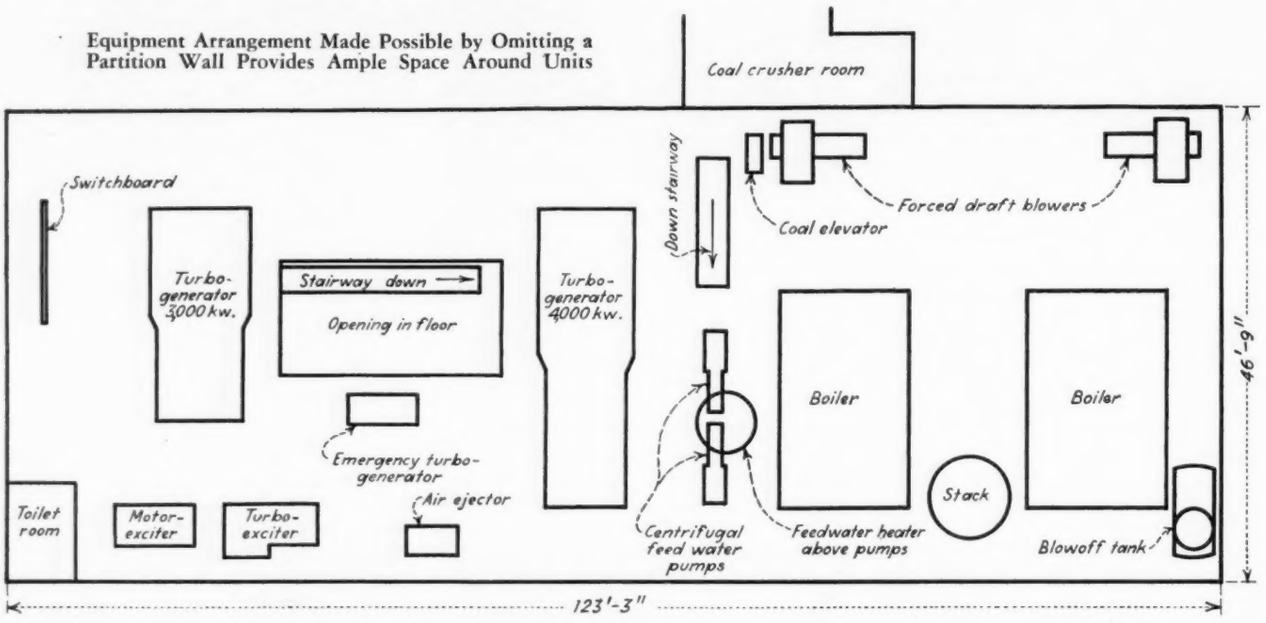
Ash is manually pulled out from the pits at the back ends of the boilers, where it falls directly into intakes of the Steamatic ash conveyor which carries it into a 25-ton tile bin. The latter is elevated and provided with an inclosed chute for loading trucks. This conveyor unit also handles the fly ash from the bottom of the stack. The ash disposal is effected without allowing an appreciable quantity of dust to find its way into the atmosphere of the power-plant building.

Condensers are Wheeler and Westinghouse, respectively, on the General Electric and Westinghouse turbo-generators. Circulating pumps are motor-driven and air is eliminated by a twin-unit Westinghouse LeBlanc two-stage air ejector. A Wheeler Radojet air pump serving as a spare is connected so it can be used with either condenser. Excitation is furnished by a 100-kw. Westinghouse motor-generator, the motor of which operates at 2,300 volts. The steam-driven exciter for starting, and which also serves as a spare for regular operation, is a Westinghouse 100-kw. unit. Emergency power supply for lighting and for essential equipment such as stokers and make-up pumps is provided by a General Electric 14.4-kw. turbo-generator.

Main generators operate at 2,300 volts and the control is by a dead-front board which mounts handles of breakers situated in the basement directly below and inclosed in steel cubicles. Instruments include a curve-drawing watt-meter and a watthour meter with a demand indicator. An auxiliary board in the basement carries controls of the lighting and plant auxiliaries except exciters. For protection against surges and lightning, a three-phase capacitor is connected to the main station busbars.

Adjacent to one end of the building is an outdoor substation which includes three Allis-Chalmers 1,250-kva. 2,300/6,600-volt three-phase transformers, four line circuit breakers, four Packard 100-kva. 2,300/220-volt single-phase transformers for house service, and three General Electric station-type Thyrite arresters. Four lines operating at 6,600 volts radiate from the plant, but

Equipment Arrangement Made Possible by Omitting a Partition Wall Provides Ample Space Around Units



only about two miles of new line construction was chargeable to the power-plant project.

The dam on Middle Fork Creek is 6,600 ft. up Chauncey Hollow from the power plant and is situated upstream from mine-water contaminations. Construction is a concrete gravity section 13 ft. 6 in. high and 175 ft. long and the reservoir thus formed holds 2,500,000 gal. Six-inch Universal cast-iron pipe conducts the water to the power plant. A typical analysis of the water from this reservoir shows a pH value of 7 (approximately neutral); temporary hardness ($Ca\ CO_3$), 0.50 grain per U. S. gallon; and permanent hardness ($Ca\ CO_3$), 0.32 grain. This water is considered to be well adapted to boiler feed and condenser cooling.

All of the boiler-feed water, be it from the dam or from the wells, is treated in a Scaife Zeolite softener. Storage of treated water totals 36,000 gal., of which 28,000 gal. is in a high tank and the remaining 8,000 gal. in the concrete basin. Operation of the plant could continue for four days on this supply in case of emergency. Water analysis and treatment recommendation services are furnished by Cyrus W. Rice & Co.

Absence of a dividing wall between boiler room and turbine room, a continuous hip roof made possible by having the boiler breechings above the roof, and special provisions to withstand floods are features of the building design. The turbine floor is 6 ft. 8 in. above yard level, the condenser basement and ash alley floors rest on bedrock and are 12 ft. 10 in. below yard level, and the firing floor is 6 ft. 4 in. below yard level. Although the boiler-room floors are at depressed elevations, the space is adequately ventilated and lighted.

The floors of the basement and ash alley are at practically the same elevations as the bed of Island Creek and during flood periods the creek water level may be 11 to 12 ft. higher than these floors. This condition required foundation walls of heavy section sealed to the bedrock and made of waterproof cement. Since the plant was put into operation a serious flood occurred without affecting the operation.

Outside dimensions of the building are 46 ft. 9 in. wide, 123 ft. 3 in. long, and the height from the top of the foundations to the under side of the roof trusses is 27 ft. 8⅜ in. Construction is steel and brick and the roof is cement tile. The walls are generously fitted with ventilated steel sash windows and the doors also are of steel. A 20-ton Whiting hand-operated crane serves the turbine room.

Saving in first cost and the operating advantage that the engineer is able to see the boilers from the turbine-room floor appear to have fully justified the design whereby the usual partition wall is omitted between turbines and boilers. Dust is controlled so effectively that the turbine room is freer of it than in many power plants that have a partition but into which uncontrolled dust from the boiler room enters by doors and windows.

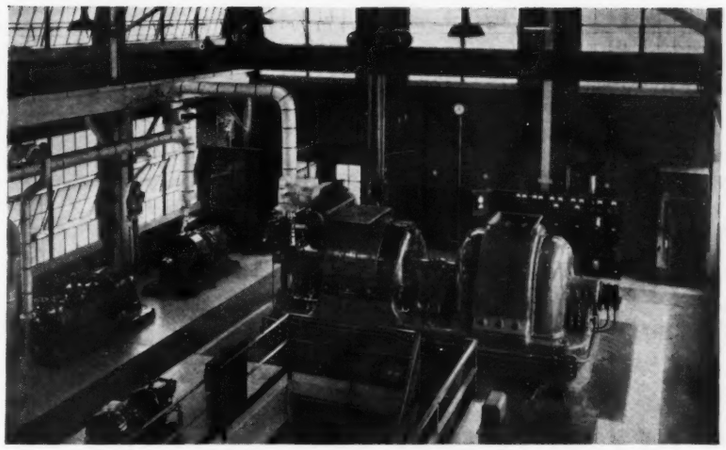
Steam and hot feed-water piping of the plant was fabricated and erected by fusion-weld methods except that the connections to valves and fittings are VanStone flanged joints. All hot-water and steam piping is thoroughly insulated and four ventilators are installed on the ridge of the hip roof.

With all of the mines running at their present capacities the plant day load averages 3,000 kw. and the power factor plays between 91 and 92 per cent lag. Peak loads of 3,800 kw. have been registered and the night load usually totals between 1,200 and 1,300 kw. At an observed load of 2,000 kw. on the 3,000-kw. unit and while the air temperature was slightly above 90 deg. F., the circulating-water temperatures were 84 deg. F. and 90 deg. F. at the condenser intake and outlet, respectively. All eight cooling-tower blowers were operating at that time, but it is the practice to operate only the number required to maintain the proper vacuum.

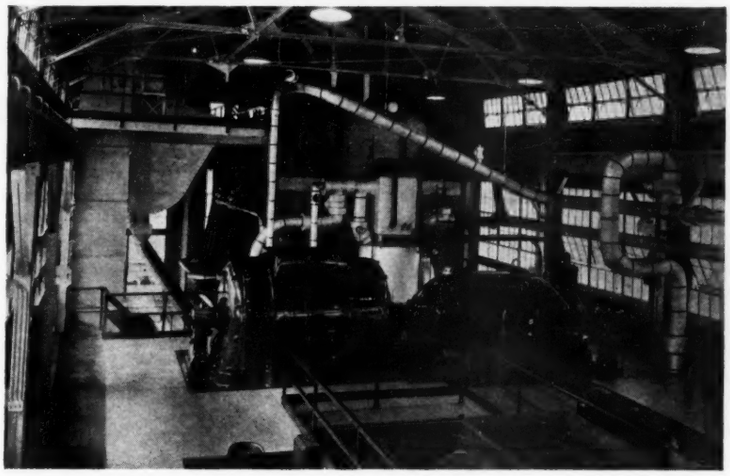
Kilovolt-ampere fifteen-minute demand billings for purchased power were 2,820 and 2,910 for the months of December, 1934, and January, 1935, respectively. Total kilowatt-hours, net costs per kilowatt-hour and coal tonnages produced for those typical months prior to the shift to local power were: 789,276 kw.-hr., 1.35 c., 187,567 tons, and 911,587 kw.-hr., 1.27 c., 171,058 tons, respectively. All power was purchased through a central metering point under the "Large Mine Power" contract rate, which contains a power-factor clause.

Twelve men comprise the operating and supervisory force and these are classified as follows: four engineers, four firemen, three handlers of coal and ash, and one power-plant superintendent. Engineers and firemen work on four six-hour shifts.

Designing and general engineering of the plant was done by the Brown-Fayro Co., Johnstown, Pa., but the construction and erection was handled by the coal company.



Present Loads Are Carried by This 3,000-Kw. Turbo-Generator.



4,000-Kw. Generating Unit at Omar. Improved Lighting, Increased Space Around Equipment and Unrestricted View Uninterrupted by a Partition Wall Are Evident.

LOCOMOTIVE TESTS

+ Prove Advantages of Automatic Protection And Reveal Motor Characteristics

By B. F. GRIMM
Consulting Electrical Engineer
Koppers Coal & Transportation Co.
Pittsburgh, Pa.

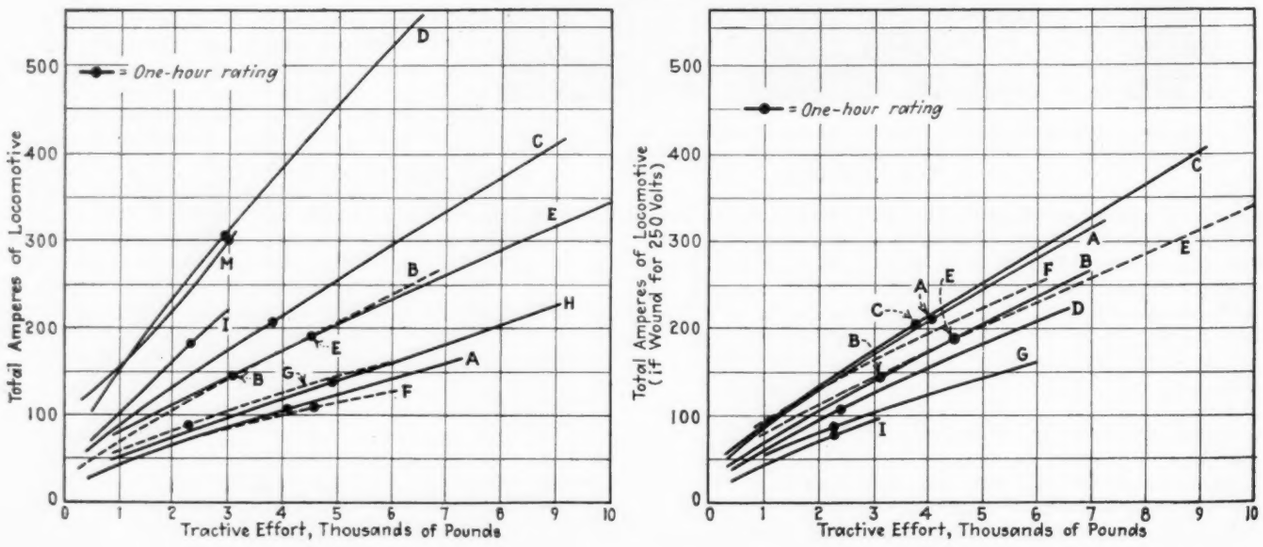
CURRENT requirements, thermal capacity, best type of overload protection, maintenance and the penalty of dirty tracks are among the items revealed in the general cost study of operating tests on battery and cable-reel locomotives at the Keystone mine of the Houston Collieries Co., McDowell County, West Virginia. Operating characteristics of the two types of locomotives in use at the mine are set forth in Table I. Curves in Figs. 1, 2, 3 and 4, however, cover not only locomotives at Keystone but also certain equipment at other mines. The *A* curves apply to the cable-reel and the *D* curves to the battery locomotives at the Keystone mine. Curves *B, C, E, G* and *H* are for open-type equipment; *F* curves are for cable-reel locomotives with sealed equipment; *I* curves for open-type battery equipment; and *M* curves for sealed battery equipment. Table II gives the locomotive ratings and curve symbols.

The higher speeds of the cable-reel locomotives at the heavier loads (when trolley pole is used) are noticeable when comparing curves *A* and *D*, Fig. 3. The one-hour rating of the cable-reel locomotives is 5.3 miles per hour at 4,000 lb. tractive effort and that of the battery locomotives is 4.4 miles at 2,900 lb. tractive effort. Horsepower per ton per mile per hour (Table II) is a measure of the capacity of the motors in relation to the weights of the locomotives. The battery locomotives (*D*, Table II) have 56.7 per cent of the horsepower per ton per mile per hour of the reel locomotives (*A*). There is less liability, however, of roasting the windings of the battery motors, due to the limited battery capacity.

In most cases 1.87 hp. per ton per mile per hour is considered ample for gathering locomotives of the trolley and reel types. This is equivalent to pulling loads up to the capacity of the locomotives with steel tires and using sand for one hour with a rise of 75 deg. C. The horsepower per ton of the battery locomotives is 3.31 and that of the cable-reel locomotives is 6.65, and on this basis the battery motors are rated 49.7 per cent of the cable-reel locomotives.

While a comparison of *E* and *H* (Table II) shows *H* is 88.7 per cent of the horsepower per ton of *E*, the horsepower per ton per mile per hour is 108 per cent of *E*. The efficiencies shown on the curve sheets were computed from the horsepower delivered to the wheels and the electrical horsepower input to the motors. Certain errors apparently occurred in making the curves for *H* because the gear losses would of necessity be greater than the total losses indicated by the efficiency of 98.5 per cent. In order to compare the current values required by the different types of equipment when delivering the same tractive efforts, the

Figs. 1 and 2—Load-Current Curves


= One-hour rating
Total Amperes of Locomotive
Tractive Effort, Thousands of Pounds
= One-hour rating
Total Amperes of Locomotive (if Wound for 250 Volts)
Tractive Effort, Thousands of Pounds

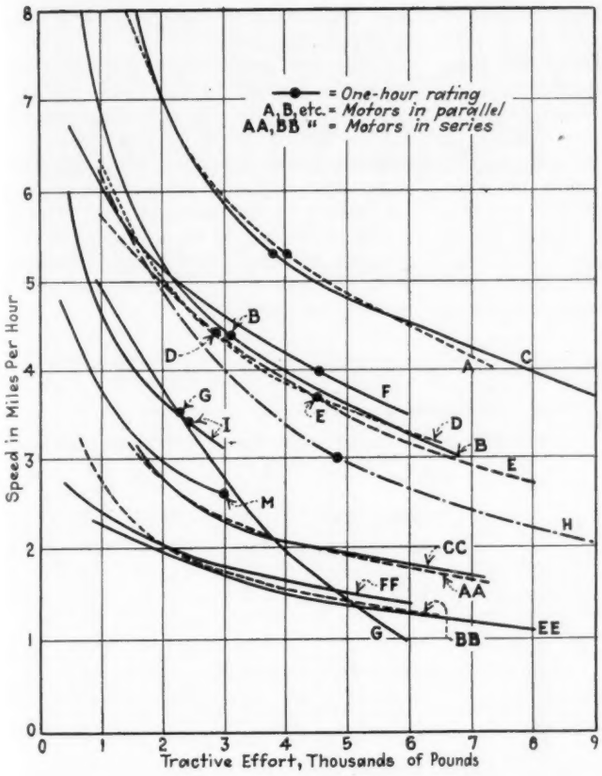


Fig. 3—Speed-Load Curves

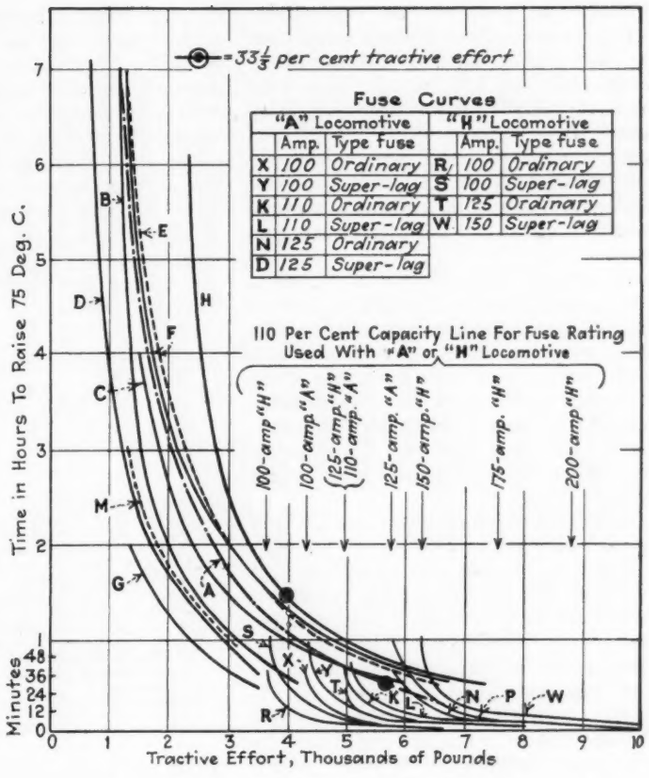


Fig. 4—Load-Temperature Curves

standard curves were prorated to the 250-volt basis. The highest current is 90 per cent greater than the lowest. The wide range is due to speed characteristics and to difference in efficiencies.

It is generally advantageous to have gathering locomotives designed for very low speeds. It is quite possible that the Keystone battery locomotives could be reduced still more in speed by reducing the number of cells without increasing the ampere-hours per car and without penalizing production. Any further reduction along this line would reduce battery costs and kilowatt-hours per ton in the ratio of the comparative number of cells.

Fig. 4 indicates the time that various loads can be hauled with a 75-deg. C. rise. It will be noted that the cable-reel locomotives (Curve *A*) will deliver 4,100 lb. tractive effort for one hour, and the battery locomotives (Curve *D*), 2,900 lb., or 71 per cent of the cable-reel-locomotive rating. A fair comparison of the all-day capacity is at the seven-hour time. The tractive efforts are 700 and 1,200 lb. The battery equipment at this point is 58 per cent of the cable-reel locomotives. Both types have ample capacity for all normal loads.

How much protection can be given to armatures by using fuses with thermal-lag plates riveted to the fuse links? The lower set of curves in Fig. 4, covering the time for a rise of 75 deg. C, shows that the use of ordinary fuses of 125-amp. capacity on locomotive *A* would be required to carry the maximum peak loads of 5,666 lb. tractive effort (33⅓ per cent of the weight). The next lower size (110-amp.) would carry this load 10 minutes, but this time would be reduced if there had been a heavy load just previous to the 5,666-lb. load. A 110-amp. fuse with lag plates would carry the load 16 minutes, or 60 per cent longer than the ordinary fuse. The time required for the locomotive-motor temperature to rise 75 deg. C. is 30 minutes. It is evident, therefore, that the 110-amp. special fuse will protect with any reasonable load. A 125-amp. fuse of either type would carry a load of 5,750 lb. continuously. This load would, of course, roast the winding insulation.

Various conditions could exist which would permit the motors to be completely roasted while using this size fuse. Weak fields, hauling long trips on steep grades, low voltage and so on, would cause serious damage. Fuses in each motor circuit, in addition to a main-circuit fuse, have proved very satisfactory. Trouble is sectionalized by this means. One motor can be used when the other is damaged, by removing one fuse in case it has not already blown.

Thermostats Most Satisfactory

Thermostats in contact with field coils, however, have proved the most satisfactory of all methods tried for locomotive protection. These protectors can be arranged to cut off the power at any temperature. Three 15-ton haulage locomotives with thermostats have been in use over six years without an armature failure. Two of these locomotives haul loaded trips up long grades. When the thermostats were first put into service the trips were automatically stopped when an excessive number of cars were hauled. The motormen soon learned the maximum safe loads for any part of the day. As far as motor protection is concerned, the thermostats proved better as load dispatchers than men could possibly be.

A locomotive designer using complicated computations could not determine the proper load for all conditions as well as does a thermostat. There are too many variables—such as temperature at start of trip; mine temperature; humidity; weight of car; condition of car wheels and bearings; track; dirt on track; field coils with either defective, reversed or damp windings; armature out of center; voltage; condition of sand; amount of brake application to prevent wheel slippage; length of haul; variable grades; defective bonds; defective air pipes and ducts (on locomotive and blowers); defective blower equipment; condition of locomotive wheels, bearings, gears and gear cases; dirt in gears; wiring; division of load between locomotives of different characteristics pulling and pushing the same trip; and, lastly, derailed cars and locomotives. Certainly, few men, if any, would be able to say "enough" at the proper time when all of the above items are considered. Thermostats, however, perform continuous police duty and always say

"enough" at precisely the right time.

Experience showed that the extra cars per trip which had been causing overloads could be left for the next trip without penalizing production. The three 15-ton locomotives meet the present haulage requirements without the use of blowers. If more coal per locomotive should be required, blowers could be added and the thermostats left in use.

At another mine having an 8,000-ft. upgrade main haul with 2,500 ft. averaging 4 per cent, tandem locomotives with thermostats and blowers are used. There have been no armature burn-outs while the armatures were protected with thermostats, but several had occurred before thermostats were applied. Thermostats on gathering locomotives have given similar results.

Table III sets forth a cost comparison of the two types of locomotives for both single- and double-shift operation. It indicates that gathering with battery locomotives costs about 1 cent per ton more than with cable-reel locomotives. The power consumption of the cable-reel locomotives at Keystone is unusually low, with a correspondingly low demand charge. Power is generated by the coal company. At other mines where conditions are different and power is purchased, the demand charge might be several times as great; battery costs also would be higher.

Cost Down on Two Shifts

Cost per ton for reel locomotives drops from $0.01986 to $0.01736 when the locomotives are used two shifts. This is due to spreading the demand charge over greater tonnage and is based on the assumption that there would be a sufficient number of spare locomotives to insure proper maintenance. The cost per ton for battery locomotives when used on two shifts increases from $0.0276 to $0.0287, due to cost of electrical demand for day charging. Energy cost has not been included in the comparison because the losses in charging and discharging batteries would about equal the mine distribution losses for cable-reel locomotives under average conditions.

One item that affects cost per ton is the condition of the tracks. If they are not kept clean, valuable battery capacity is dissipated with no useful work performed. This either reduces the cars per shift, requires an unnecessarily large battery or makes it necessary to use a second locomotive in the section to gather cars that should be gathered by the regular locomotive. All of these items materially affect the cost per ton. If gatherings were performed under ideal conditions every day, battery size and battery cost could be reduced considerably. Details of a test over clean and dirty tracks are reproduced on p. 382 of this issue.

Cable-reel locomotives require that tracks be bonded in the room entries, but, of course, bonds are not required in the rooms when double-conductor cables are used. Bonding is required in room entries also to complete a circuit for mining machines and pumps. There would, therefore, be no difference in the quantity of bonds required at Keystone by replacing cable-reel locomotives with battery locomotives.

Table I—Operating Characteristics of Gathering Equipment

Cars Pulled, Empty and Loaded, Respectively; Also Per Cent Track Grade

	0–8 2	0–4 2	0–8 Level	0–1 2	1–0 2	0–0 2
Battery locomotive:						
Tractive effort, pounds	3,420	1,980	1,140	900	660	540
Miles per hour, 54-cell battery, based on 1.85 volts per cell for all loads	4.10	5.00	5.10	6.80	6.88	7.10
Miles per hour, 45-cell battery (neglecting slightly higher voltage for larger cells)	3.42	4.18	5.09	5.66	5.74	5.92
Minutes to travel 1,000 ft., 45-cell	3.32	2.72	2.23	.....	.....	.....
Minutes to travel 400 ft., 45-cell	.....	.....	.....	.80	.79	.76
Cable-reel locomotive (500-volt):						
Miles per hour, parallel operation	5.65	7.04	8.52	.....	.....	.....
Miles per hour, series operation	.....	.....	.....	3.80	4.10	4.30
Amperes, parallel, total	93.50	65.00	46.50	.....	.....	.....
Amperes, series	.....	.....	.....	20.20	17.50	15.70
Amperes cable-reel motor, additional	.....	.....	.....	12.00	12.00	12.00

Table II—Locomotive Ratings and Curve Symbols Pertaining to Figs. 1, 2, 3 and 4

			Horsepower, One-Hour Rating			Efficiency	
Curve	Voltage	Weight Tons	Total	Per Ton	Per Ton Per Mile Per Hour	1,000 Lb. Tractive Effort	3,000 Lb. Tractive Effort
A	500	8.5	56.50	6.65	1.25	83.5	84.0
B	250	6.0	36.10	6.02	1.36	79.0	76.0
C	250	6.0	53.80	8.99	1.69	86.0	82.0
D	100	9.2	30.60	3.31	0.71	84.0	82.9
E	250	6.0	44.40	7.40	2.00	56.8	74.5
F	500	8.0	49.10	6.15	1.54	53.5	67.5
G	250	5.0	21.45	4.30	1.23	71.3	66.9
H	250	6.0	39.40	6.57	2.16	96.0	98.5
I	110	5.0	21.70	3.95	1.14	83.0	84.8

Table III—Costs of Gathering Locomotive Operation
(Energy Portions of Power Charges are Omitted)

	Demand Cost $2.25 Per Kw.		Demand Cost $1.50 Per Kw.	
	Cable-Reel	Battery	Cable-Reel	Battery
Single Shift:				
Cars per month	1,069	1,024	1,069	1,024
Tons per month	4,276	4,096	4,276	4,096
Maintenance per month	$53.05	$31.14	$53.05	$31.14
Cable per month[1]	$10.50	.....	$10.50	.....
Battery per month[2]	.....	$82.00	.....	$82.00
Demand per month[3]	$21.37	.....	$14.25	.....
Total per month[4]	$84.92	$113.14	$77.70	$113.14
Maintenance per car	.04960	.0304	.04960	.03040
Cable per car[1]	.00983	.....	.00983	.....
Battery per car[2]	.....	.0802	.....	.08020
Demand per car[3]	.02000	.....	.01335	.....
Total per car[4]	.07943	.1106	.07278	.11060
Maintenance per ton	.01240	.00760	.01240	.00760
Cable per ton[1]	.00246	.....	.00246	.....
Battery per ton[2]	.....	.02000	.....	.02000
Demand per ton[3]	.00500	.....	.00333	.....
Total per ton[4]	.01986	.02760	.01820	.02760
Double shift:				
Cars per month	2,138	2,048	2,138	2,048
Tons per month	8,552	8,192	8,552	8,192
Maintenance per month	$106.10	$62.28	$106.10	$62.28
Cable per month[1]	21.00	.....	21.00	.....
Battery per month[2]	.....	164.00	.....	164.00
Demand per month[3]	21.37	9.00	14.25	6.00
Total per month[4]	148.47	235.28	141.35	232.28
Maintenance per car	.04960	.03040	.04960	.0304
Cable per car[1]	.00983	.....	.00983	.....
Battery per car[2]	.....	.08020	.....	.0802
Demand per car[3]	.01000	.00440	.00600	.0029
Total per car[4]	.06943	.11500	.06543	.1135
Maintenance per ton	.01240	.0076	.01240	.0076
Cable per ton[1]	.00246	.....	.00246	.....
Battery per ton[2]	.....	.0200	.....	.0200
Demand per ton[3]	.00250	.0011	.00150	.0007
Total per ton[4]	.01736	.0287	.01636	.0283

[1]Based on one cable per year.
[2]Battery cost includes freight and labor.
[3]Based on a test on Locomotive No. 17.
[4]These totals are of the four items directly above.

QUALITY RISES

+ With Adoption of Coal Saws

For Killarney Face Preparation

REDUCTION in ash in shipments from 6 to 3.18 per cent resulting from the replacement of shortwall mining machines with coal saws has resulted in a material improvement in the competitive position of coal from the Kilpoca No. 3 mine of the Killarney Smokeless Coal Co., in the Winding Gulf field of southern West Virginia. Mining at Kilpoca No. 3, one of two mines operated by the company at Killarney, formerly was based on taking 44 in. of the Pocahontas No. 3 seam and rejecting 23 per cent of the material in the preparation plant. Now, only 30 in. of the seam is mined and the remaining 14 in. is gobbed along the ribs in rooms, leaving only a very small percentage of material for removal on the surface. The combination of undercutting, topcutting and shearing in the 30-in. coal for the purpose of minimizing shattering of the high-ash top and increasing lump yield is made possible by the narrower kerf of the saw. The method of face preparation used also is capitalized in the merchandising of the output through the Old Ben Coal Corporation, Chicago, which features the product in picture and text as "sawed coal."

In the seam at Killarney (Fig. 1), the 5-in. stratum of high-ash coal adheres tightly to the bone above and below, and the same intimate relation exists between the low-ash coal and the bottom bone. Because the bone has a columnar structure and no cleavage plane exists between it and the coal, explosives fired at the top shatter the vein in a vertical direction through the two layers of bone. The preparation plant is equipped with both wet and dry mechanical cleaners, but results were unsatisfactory in the past because the washability curve has no break.

Mine officials state that under the previous system of mining it would have been necessary to reject 30 per cent of the seam in the preparation plant to eliminate all of the bone clinging to small pieces of coal. Taking only the 30-in. bench and cutting only in the coal

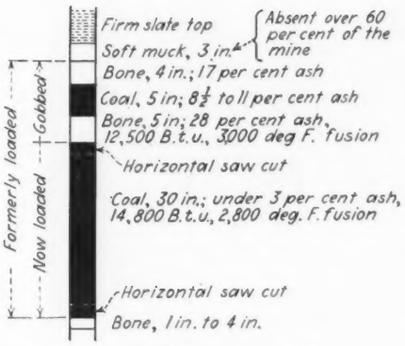

Firm slate top
Soft muck, 3 in.
Absent over 60 per cent of the mine
Bone, 4 in.; 17 per cent ash
Coal, 5 in; 8½ to 11 per cent ash
Bone, 5 in; 28 per cent ash, 12,500 B.t.u., 3000 deg F. fusion
Horizontal saw cut
Coal, 30 in.; under 3 per cent ash, 14,800 B.t.u., 2,800 deg. F. fusion
Horizontal saw cut
Bone, 1 in. to 4 in.
Gobbed
Formerly loaded
Now loaded

Fig. 1—Pocahontas No. 3 Seam at Killarney, W. Va.

makes it possible to load a 3 per cent ash product, including the cuttings.

Further evidence to support the new sales position of the mine is afforded by the data used in advertising the "sawed coal," as follows: "moisture, 1.10 per cent; volatile, 15.49 per cent; ash, 3.18 per cent; carbon, 80.23 per cent; sulphur, 0.6 per cent; B.t.u., 15,100; ash fusion, 2,800 deg. F." In common with other coals from the Pocahontas No. 3 seam, the mine product is a coking coal esteemed for use in byproduct ovens. Structurally the coal is soft, therefore it requires careful face preparation to secure a lump yield favorable to domestic sales.

Three Type 6-A track-mounted Sullivan coal saws are in use. One was installed in November, 1934, and the other two in January of this year. At the present production rate of 700 tons per day, one saw is worked three shifts and the others are worked two shifts. The saws are equipped with 6-ft. cutter blades which make a kerf 2½ in. thick. Cutting depth averages 5½ ft. Weight of the saw is approximately 6 tons and the principal dimensions are: height, 29 in.; width, 5 ft.; length, with saw folded back in tramming position, 18 ft.

Rooms are cut 20 to 24 ft. wide and for the most part are now being driven on 70-ft. centers. In a short time, how-

Bottom Cut and Shear Cut Have Been Made. Coal Saw Now Sumping to Start Top Cut.

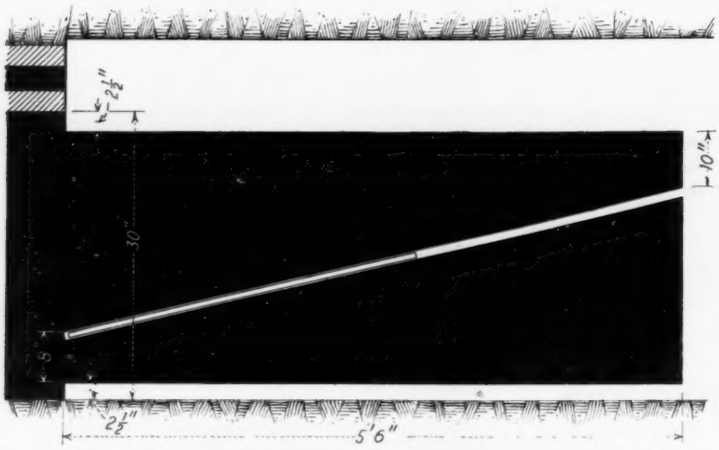
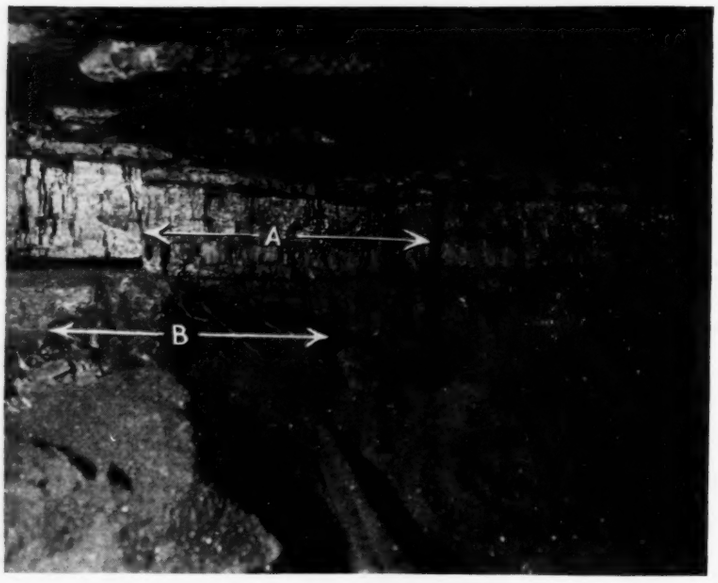


Fig. 2—Top and Bottom and Shear Cuts Made; Top Shot, Raked Out and Gobbed; 37-In. Cardox Shell in Position for Rib Shot



Sawing Has Been Completed. Coal and Bone Above Top Cut Have Broken Down for Length "A" Adjacent to Center Shear Cut. "B" Is Top Rock Fallen From Above "A."

Gobbed on the Right in This Room Are 14-In. Blocks of Bone and Top Coal.

ever, the entire production will be obtained from the honeycomb system of retreat from the boundary, in which system the room centers will be 35 ft. apart.

About three years ago and before the use of saws was considered at the mine, Cardox shooting was adopted to improve lump coal. Its use has been continued and is considered a necessary complement to the saws. Permissible explosives are employed, however, to break down the 14-in. stratum of high-ash coal and bone, which is gobbed. Under the old system of mining, when one under cut was made with a shortwall machine, the Cardox holes were drilled into the 5-in. stratum of high-ash coal.

Under the present system, employing the coal saws, a vertical shear cut is made in the center of the room through both the coal and the bone, an under cut is made in the coal with special care to avoid hitting the bone and then a top cut is made in the coal, with the same precautions regarding the upper bone. Cuttings are loaded into the car before the top stratum of bone and coal is broken down by a shot at each rib. The charge per hole consists of one stick of Liberty No. 11 permissible, 1¼x8-in., with a count of 250 sticks per 50-lb. box. After the miner has gobbed the 14 in. of top material and has cleaned the top of the coal and the floor in front of the cut he breaks down the coal with Cardox, employing one shell at each rib.

Three types of 1¾-in. diameter Cardox shells are available to the miners: B-44, B-37 and B-20 (the numerals of type numbers designate length of shell in inches and comparative strength of charge). Each morning at the lamp house the miner specifies the size of shells he wants delivered to his working place. The Cardox hole (Fig. 2), which is drilled by hand, is started about 10 in. below the top cut and is angled downward so that the back end of the hole is about 8 in. from the bottom of the cut. This positions the shell slightly below the center of the coal. Otherwise, the charge would blow out into the top cut, for obviously the lower part of the coal seam offers greater resistance to the shot.

In many cases, the bone and coal top to be gobbed breaks down of its own weight for a distance of a few feet on one or both sides of the center shear cut. The rib shots are always required, however, to free this top material from the sides. The 30-in. coal stratum usually bends down at the center but does not break. The miner does the drilling and loading for both permissible and Cardox.

Timbering in rooms consists of a row of posts on each side of the track 2 ft. from the rail. The individual posts of a row are 5½ ft. apart and the timber clearance from the face is 15 ft. Recovery by the honeycomb system is expected to average 80 per cent, which figure is based on company experience

(Turn to page 379)

DRESSER SEALING METHODS

+ Offer Safe, Low-Cost Protection Against Water Breaks

By IVAN A. GIVEN
Associate Editor, Coal Age

WITH water breaks an ever-present possibility, sealing of worked-out areas to prevent inrushes into live sections is the general practice at the Dresser mine of Walter Bledsoe & Co., Terre Haute, Ind. Sealing therefore is treated as an essential part of the routine of mine operation rather than as a special, or emergency, activity, and consequently has been studied with an eye to obtaining seals of the requisite strength at the lowest possible cost. For the typical high-pressure seal of concrete reinforced with steel rail, this cost approximates 45c. per cubic foot, including all labor and materials, but not power, which is not separately determined.

Operations at Dresser are in the Indiana No. 5 seam, which averages 4 ft. in thickness and is reached by a shaft sunk approximately 600 ft. west of the Wabash River. The main entries recently have been extended to tap new territory on the east side of the river, which flows in a channel cut in the glacial wash extending down from the surface to the solid stratum over the coal. This wash consists of a mixture of sand, gravel and larger boulders with dimensions up to 18 to 24 in. Thickness of the wash varies from 100 to 150 ft., which, as a result of its loose nature, is constantly saturated with water.

In contrast with the comparatively thick layer of wash, the solid stratum over the coal occasionally decreases to a minimum of 50 ft. The average is 80 ft. Consequently, any roof breaks in the worked-out sections are quite likely to extend up to the wash, with a resultant inflow of water and, in some cases, of the wash itself, which is sufficiently loose to flow readily through breaks of any size. To meet this condition, the Dresser management follows the practice of installing low-pressure seals at the mouth of every panel of 48 rooms and high-pressure seals at the mouth of every section. Low-pressure seals are placed across the panel entries just off the cross entries and high-pressure seals across the cross entries just off the main entry.

Normally, the hydrostatic head a seal is called on to withstand is about 200 ft., giving a pressure of approximately 80 lb. per square inch. Variations above or below this figure may result through changes in the level of the water in the river or upon the location of the seal at a high or low point in the mine. In the case of high-pressure seals, design is based on a minimum safety factor of four to one, as well as on a reduction of leakage to a point approaching zero at the maximum pressure. Consequently, each high-pressure seal is equipped with a hollow reinforcing arch to add to the strength and increase the length of the path the water would have to travel in passing from the back of the seal to the front.

All seals of either the high- or low-pressure type are hitched into the ribs a distance approximately equal to their thickness and are carried to solid sandstone at both the top and the bottom. Various stages in excavation for and construction of a high-pressure seal are shown in Figs. 1 to 3, inclusive, which show application to a standard heading width of 12 ft. with average thicknesses of coal, fireclay bottom and black slate top.

In making the excavation to receive the seal, the first step is to drill the hitches in the coal, using the hitch drill ordinarily employed in timbering entries (June *Coal Age*, p. 237). In this operation, a 12-in. cutting head is employed and the holes are spaced so that they cut into one another. Usual width of the hitch in the case of high-pressure seals is 4½ ft., corresponding to the

High-Pressure Seal at End of First Stage of Construction, Showing Bottom Portion in Place and Vertical Reinforcements in Position

Completed High-Pressure Seal, Showing Pipes Used in the Blowing Operation

standard width of the seal. The black slate top, varying from 24 to 48 and averaging 32 in. in thickness, is then taken down to the overlying sandstone, small charges of explosive being used when necessary, and the work squared up with a pick. The black slate is removed far enough in front of the arch to allow subsequent operations to proceed without interference. The fireclay bottom, varying from 30 to 60 and averaging 36 in. in thickness, is then taken up down to the underlying sandstone. The excavation in the bottom is made approximately 1 ft. longer than the finished arch to permit installing the forms, and also is cut back about 1 ft. behind the seal for the same purpose. Corners on the arch side of the seal are rounded so that a wedging effect is secured when the seal is under pressure. Removal of the bottom generally is performed with a pavement breaker supplied with air by the Dresser portable track-mounted compressor unit (July *Coal Age*, p. 300).

Upon completion of the excavation, the vertical reinforcing members for the seal are set on 24- to 30-in. centers and are wedged in place by driving cap pieces over the top. Verticals on either end of the row generally are set about half way back in the hitch. Forms for pouring the bottom section of the seal and the floor and sidewalks of the arch are then set in place. To facilitate installation, forms at Dresser have been made up in various sizes to allow repeated use in various widths of entries and heights of excavations; arch forms, for example, being made in three sizes to fit 12-, 13- and 14-ft. entries. As indicated in Fig. 2, the forms in front of the lower section of the seal and around the sidewalls of the arch are set on brick supports one brick square and approximately 1 ft. high. This allows the concrete to flow out across the bottom of the excavation to form a floor for the arch approximately 1 ft. thick.

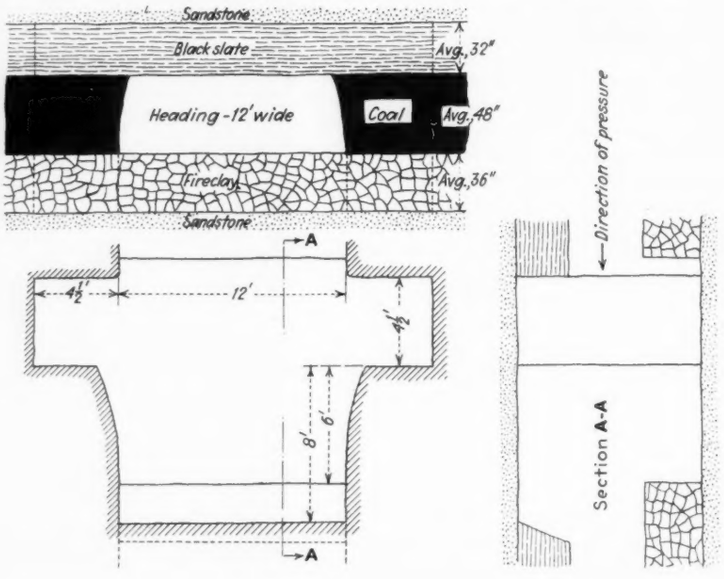
Dry mixing of concrete in an ordinary batch mixer on the surface is the practice at Dresser mine. Aggregate consists of equal parts of $1\frac{1}{2}$x$\frac{1}{4}$-in. screened gravel and $\frac{1}{4}$-in. sand to make a 1-$2\frac{1}{2}$-$2\frac{1}{2}$ mix. The gravel and sand are unloaded separately into two rectangular storage yards between the railroad and supply tracks, each yard having a capacity of about three railroad cars. The mixer is mounted on a platform under a shed on the dividing line between the gravel and sand yards and directly across the supply track from the cement storage shed. As fast as each batch is mixed, it is dumped into a mine car, which is marked with the time of mixing and started down into the mine.

Dry mixing on the surface was adopted because of the limited room available for mixing at the point of use underground. One of the major problems with this method of mixing, of course, was the length of time that the mixture would retain its setting ability. This problem was taken up with the Portland Cement Association, which fixed the time limit at 5 hours with standard cement. The latter is used at Dresser in the majority of cases, although Incor quick-setting cement is employed where time is an element in the installation of a seal. With the quick-setting type, the allowable time before the mixture begins to suffer loss of effectiveness has been set at 2 hours.

Upon arrival at the seal, the dry mixture is shoveled into the forms, where it is placed by two men, and water is added. The constant tramping back and forth of the men consolidates the material and prevents the formation of voids. As the height of the seal is built up, horizontal reinforcing members of 60-lb. steel are placed. These members are cut to a maximum length permitting easy installation, which generally means that they extend just slightly beyond the end verticals in each hitch. Horizontal reinforcements are spaced on 12- to 16-in. centers, with the ball of the rail away from the pressure side of the seal, in contrast with the vertical reinforcements, which are placed with the ball facing the pressure. Shearing reinforcements of 20- to 60-lb. rail, as desired, are installed as in Figs. 2 and 3 as an additional safeguard against shearing along the line of the side wall of the arch. Spacing of shearing reinforcements generally is 12 in.

Actual "pouring" of the seal takes place in three stages. In the first stage, the bottom and side walls of the arch

Fig. 1—Excavation for High-Pressure Seal Under Average Conditions



and the lower section of the seal are poured up to the bottom of the seam. Upon completion, dowel pins are set in the side walls (Fig. 2) to act as reinforcements for the joints between the upper and lower parts of the arch, and a number of wood ties are sunk in the surface of the concrete in the seal to make the mortise half of a species of mortise-and-tenon joint. The lower section is then allowed to cure for a week in the case of standard or 48 hours in the case of quick-setting cement, after which the upper sections of the seal and arch are poured.

In constructing the upper section of the seal, the back form usually is omitted and a brick wall one brick length thick is built sufficiently wide and high to overlap the roof and sides of the original heading, using a cement mortar. This wall may be built all at once or as required, depending upon whether preservation of a ventilating current is desired. The remaining horizontal reinforcements are then wired in place and the arch forms and the forms for the front portion of the seal are then installed, leaving an opening in the top part of the arch large enough to permit the placing of materials and accommodate the two men engaged in spreading the concrete. If the seal is to be equipped with an outlet pipe, the pipe is placed about 1 ft. above the bottom of the seam and is held in place in the brick wall behind the seal and the form in front.

Outlet Pipe in One Seal

One seal in the group closing off any particular entry is equipped with an outlet pipe and valve. In the case of important high-pressure seals, 6-in. outlets are employed with gate valves. These outlet pipes consist of 3-ft. lengths of Toncan iron and common steel pipe welded together. In installing the pipes, the Toncan acid-resisting section which carries the valve is placed so that it projects through the front of the seal, the joint between the two sections being placed about midway through the seal. On less important high-pressure seals and on low-pressure types, 2- to 4-in. wrought iron outlet pipes with plain iron cocks are employed. To prevent floating wood from entering the outlet pipe, in case it is desired to pump the water down behind a seal, the inner end is protected by a strainer made of old screen plates with 1½-in. round openings. Two of these plates, each about 36 in. square, are welded together in a V. The top is covered by an additional screen-plate section and the bottom is left open. Installing the strainer is merely a matter of setting it on the bottom so that it covers the inlet end of the pipe and rests snugly against the back of the seal.

Pouring of the upper section of the seal and arch proceeds substantially as in the lower section until the structure reaches a height where the men are unable to work behind the forms. Water is then mixed into the dry material in a trough and the wet concrete is rammed back into place. When the seal reaches the proper height, three pipes, used in completing the concrete work, are placed as shown in Fig. 3. These pipes project through the arch form up to high points in the roof along the center line of the seal. The pipe ends within the seal are covered with tape to prevent the entrance of concrete and keep them open for the final operation. After placing the three pipes referred to, concreting is continued up to within 1 or 2 in. of the top and a row of bricks is laid along the top of the concrete at the front of the arch, leaving one small hole between adjacent bricks for subsequent use. The usual curing time for the type of cement is then allowed to elapse.

Final operation on a seal consists of blowing a mixture of one part cement to two parts sand into the space between the concrete and the roof, using as many of the three pipes as necessary, the tape seals having been broken with a bar and the pipes equipped with valves in anticipation of this step. One gallon of Johns-Manville "Celite" is added to each sack of cement used in the sand-cement mixture to take up the water

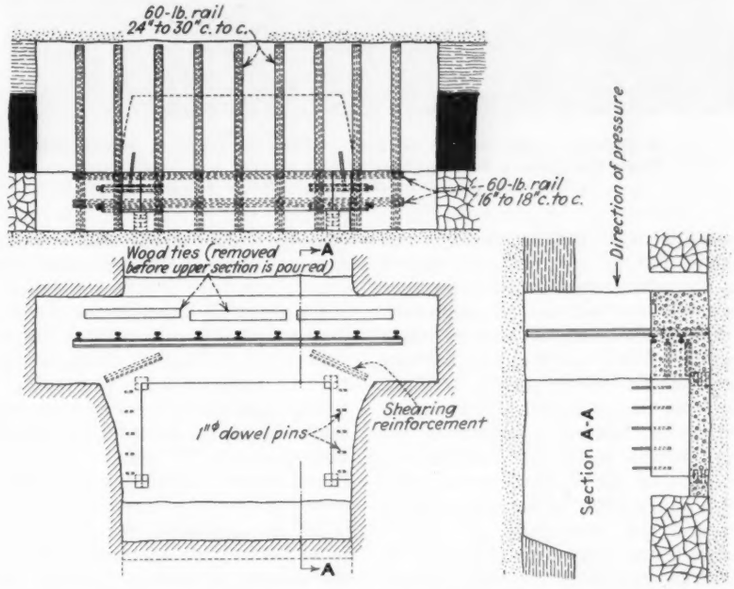


Fig. 2—First Stage in Construction of a High-Pressure Seal. Vertical Reinforcements Have Been Placed and the Bottom of the Seal Proper, as Well as the Side Walls and Floor of the Arch, Has Been Poured

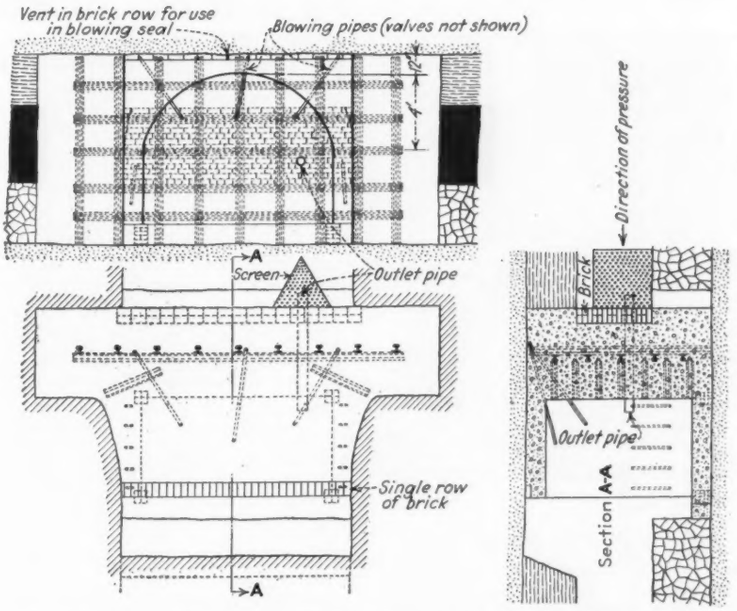
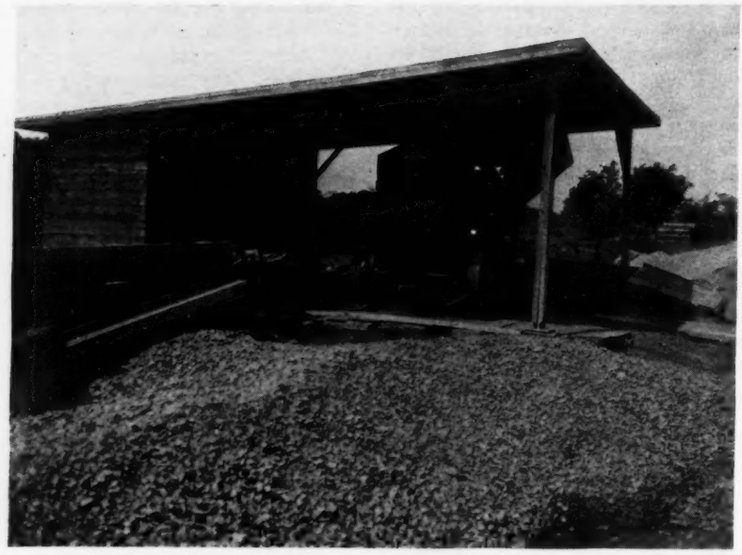


Fig. 3—Completed High-Pressure Seal, Showing Position of Blowing Pipes, Outlet Pipe and Use of Brick Across Heading on Pressure Side



Concrete Mixing Plant on the Surface. Mixer is Located Across Supply Track From the Cement Storage Shed, With Gravel and Sand Yards to the Left and Right of the Mixer, Respectively

and eliminate all but a minimum of shrinkage during curing. Air forced out as the mixture is forced in escapes through the vent hole before mentioned. This hole also serves to indicate when the space is filled with the sand-cement mixture, which then begins to run out. The hole is then plugged and the plug braced against the roof. Thereupon, the pressure is run up to the limit of the compressor, or 120 lb. per square inch, for 30 minutes, after which the valve is closed and the compressor is disconnected. About two days later, with standard cement, the valves are removed from the three pipes and the cement, which has not had an opportunity to attain its full strength, is knocked out.

Calculations made by the management and checked by independent authorities indicate that high-pressure seals constructed as above will withstand a maximum pressure of 500 lb. per square inch. No leakage is experienced at 40 to 50 lb. per square inch. At 80 lb. per square inch some leakage is encountered, but this in general does not come from around the seal but rather through the coal and the black slate. The latter is characterized by small cracks which continue for some distance, and when these cross a pillar diagonally some water at maximum pressure will flow from behind one seal across the top of the coal to a point in front of the seal in the adjacent heading, where it escapes. Springing down the black slate upon removal of the coal is thought to be a cause of leakage over the top of seals constructed in the conventional manner, this conclusion being based upon the fact that seepage is materially reduced where the tops of the seals are blown, thus, it is believed, forcing the slate back up to its original position.

Equipping one of a group of seals in a particular entry with an outlet, or bleeder, pipe not only allows the water to be pumped out, if desirable, but also permits water to be pumped back into the sealed area, with a substantial reduction in head as compared with pumping to the surface.

As indicated above, the cost of typical high-pressure seals is approximately 45c. per cubic foot. Actual cost of materials and labor for four seals in 1, 2, 3 and 4 Mains Southeast are given in Table I. In the case of low-pressure seals, the cost per cubic foot is approximately 50 per cent greater. This arises out of the fact that, though the seals are smaller and are not equipped with arches, the work involved in preparing for them is but little less than that required for the high-pressure type.

Low-pressure seals vary from 24 to 36 in. in thickness, depending upon the pressure they may be called upon to withstand. They are built with the conventional wooden forms and are not equipped with reinforcing arches, although these can be added subsequently if required. Also, low-pressure seals are built up without blowing to fill in the top. They are, however, hitched into the ribs and into the top and bottom to the solid sandstone as in the case of the high-pressure type. The concrete also is mixed and placed in the same manner.

Table I—Material and Labor Cost for Four High-Pressure Seals in 1, 2, 3 and 4 Mains Southeast, Dresser Mine

Materials	Total
12 sacks Incor cement @ 95c. each	$ 11.40
933 sacks standard cement @ 68¾c. each	641.44
10 sacks lime @ 41c. each	4.10
1,000 large brick @ $5 per thousand	5.00
188 cu. yd. sand @ $1.05 per yd.	197.40
184 cu. yd. gravel @ $1.25 per yd.	230.00
15,940 lb. 60-lb. rail @ $15 per ton	119.55
1 6-in. Toncan iron pipe	13.30
1 6-in. gate valve	43.87
Total materials	$1,266.06
Labor	
183 shifts bottom labor @ $4.57½	$ 837.23
23 shifts top labor @ $4.20	96.60
Total labor	933.83
Grand total materials and labor	2,199.89
Contents of seals, cubic feet	4,992.00
Cost per cu. ft.	0.441

Note: Seals started Dec. 2, 1933; completed Oct. 15, 1934. Depth of cut in bottom, 4½ ft.; in top, 3 ft.; depth of hitches, 4 ft.

Big Chief No. 10 Adds 1,200 Tons Daily To Michigan Production Roll

(Concluded from page 364)

are fired with Firite and Taylor stokers using 1¼-in. raw screenings made on a short length of screen on the upper raw-coal shaker and transported to the bunkers in the boiler room by a chain-and-flight conveyor, and supply steam not only for heating, drying sand (which is dropped into the mine from a brick sand house built over a borehole), hoisting and miscellaneous uses but also for operating generating equipment. Maximum boiler pressure is 200 lb.; working pressure is 150 lb.

During the development stage both underground and surface loads — all direct current—were supplied by two 100-kw. engine-driven d.c. generators. One of these units will be retained to carry the surface load of approximately 100 kw. and the other will be kept as a standby when a 500-kw. Westinghouse turbo-generator now installed goes into service. The 2,300-volt alternating current generated by this machine will be converted into direct current at 250 volts by a Westinghouse 300-kw. motor-generator set. Underground load at full production will average approximately 300 kw., largely made up of cutters and locomotives.

At the normal scale of production of 1,200 tons, the total number of employees is approximately 300. Of these, 250 to 255 are employed underground, including 210 to 215 miners. The mine is equipped with a bathhouse accommodating 300 men, in addition to offices, shops and storerooms. The Robert Gage Coal Co. is headed by Charles Coryell. John Coryell is vice-president in charge of operations; Harrison Evans, mining engineer; Joseph Bresett, electrical engineer; and Barney Langley, superintendent, No. 10 mine.

DEEPWELL TURBINE

+ Pumping From Caved Area

Aids Retreat and Earns 50 Per Cent

They Found the Answers

WHEN the Star Coal & Coke Co. decided to install a deepwell turbine pump to meet its special drainage problems, management still had to face these questions:

Would the deepwell borehole hit the entry between pillars in the sump?

Did shooting the hole, in case it hit the solid coal, offer a possibility of success?

What type of screen should be used at the bottom?

Would the mine water continue to drain through the fallen area to the pump?

What the answers were are told in the present story.

INSTALLATION of a deepwell turbine pump solved a special drainage problem at the Star Coal & Coke Co. mine, Red Star, Fayette County, West Virginia, and at the same time inaugurated a power and labor saving which will return the $10,000 investment in two years. Although the mine will be worked out within ten years at the present rate of production—600 tons per day—the company executives did not make the common mistake of allowing the relatively short life to stand in the way of a paying investment in new equipment. Quite likely the pump will have a considerable value for utilization at some other mine after it has served its time at Red Star.

"Labor saving alone will in three years return the total investment in the new pumping plant," was the conservative comment of R. W. Massie, general superintendent, when asked if the installation is saving money. There can be no mistake about the labor saving because all of the former expense for pumpers—24 hours per day in wet seasons—is eliminated and Mr. Massie himself usually starts and stops the new pump, which is about two miles by hard-surfaced road from his office.

Purchased-power saving is the other principal item. According to electrical and water-flow tests and a report made by the West Virginia Engineering Co., consulting electrical engineers for the coal company, the new pump is effecting a power saving of $1,512 per year, based on pumping only the same quantity of water as was handled in 1931 by the underground station which was displaced. It is contemplated that maintenance material cost for the new plant will be far below that of the old plant.

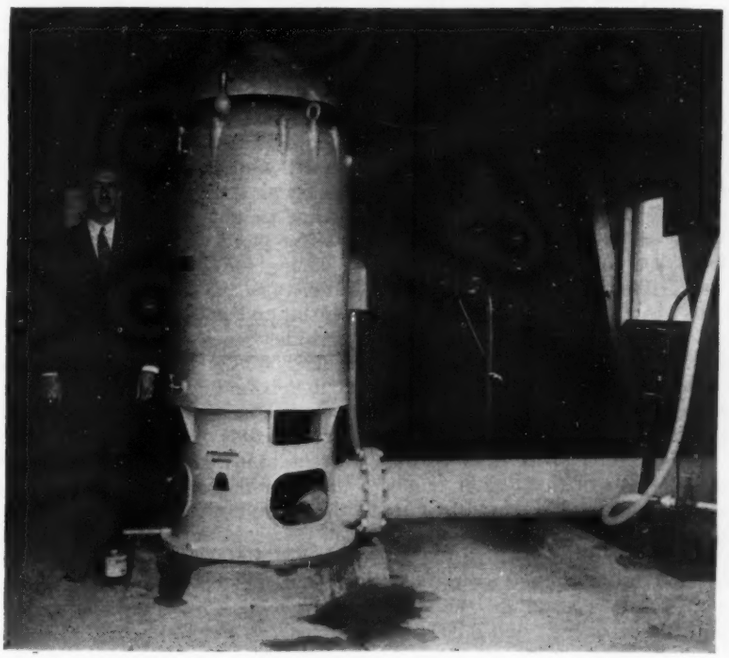
The mine is in Sewell seam coal averaging 56 in. in thickness and capped by a strong sandstone. Rooms were mined over the entire area and retreat pillaring is now in progress, as indicated in Fig. 1. From the tipple, located at the outcrop, the seam has a general dip except for a 1,200-ft. flat through the center of the property. The pillar line is now beginning to advance over that flat.

Until the turbine pump was installed drainage was effected by a pumping station near the inby edge of the flat. Suction was through several hundred feet of pipe reaching back into an inaccessible sump where several pillars were left standing. Discharge was through a 290-ft. borehole. Equipment consisted of two 250-g.p.m. triplex plunger pumps and a centrifugal pump. The latter was rated at 1,000 g.p.m. but delivered only 600 r.p.m. because it was pumping against a head higher than that for which it was intended.

Robbing had progressed until the general pillar line was beyond the pump location, thus interfering with the regular retreat. Moreover, increased influx of water dictated that the pumping capacity be increased. Drilling a new discharge hole and relocating the pumping station back on the flat would have required a choice between two disadvantages: a long suction line with the end inaccessible or incomplete draining of the flat.

Investigation showed that if a hole could be drilled from the surface into the inaccessible sump and a deepwell turbine pump of sufficient capacity installed, the drainage troubles at the mine would be over for all time. Water level in the gob could be kept low enough to permit complete robbing of the flat and then the level could be allowed to rise as the retreat was continued up the pitch toward the drift portal, thus reducing power consumption. The vertical head would decrease from 295 ft. to a final figure of 47 ft. upon completion of mining.

Pumping Head and 150-Hp. Vertical Hollow-Shaft Motor Overshadow R. W. Massie, General Superintendent.



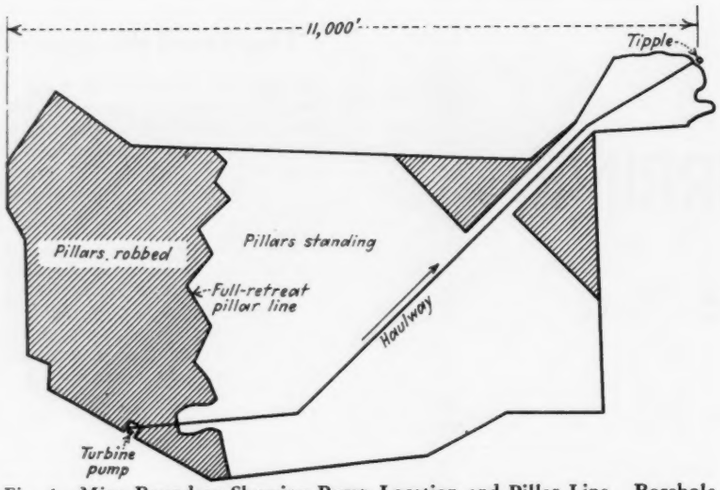


Fig. 1—Mine Boundary Showing Pump Location and Pillar Line. Borehole Was Drilled and Installation Made When the Area Was Inaccessible.

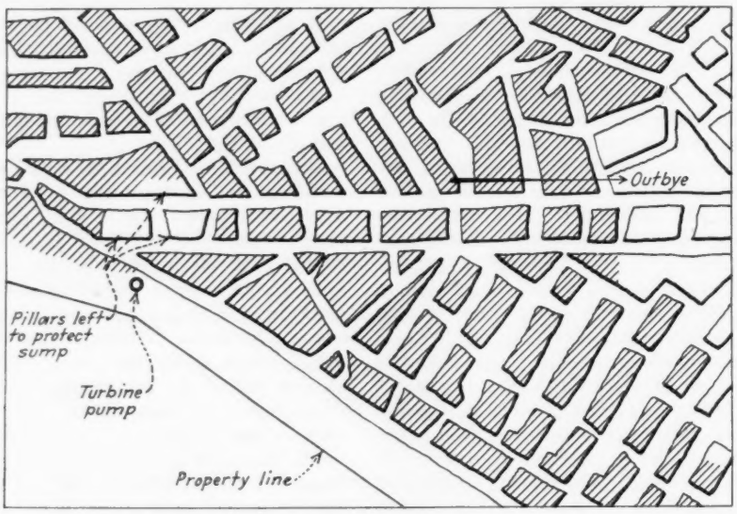


Fig. 2—Pump Borehole Hit the Barrier Pillar About 12 Ft. From the Rib.

Because of the strong roof and its tendency to break in large blocks, company officials decided there would be but slight chance of the gob holding back the water. Therefore, they proceeded with the work. An 18-in. hole was drilled, striking the top of the coal 302 ft. below the surface. Instead of an open space, the hole hit the solid coal at a point about 12 ft. from the rib line. Two shots of nitroglycerin were necessary to blow out the coal and connect the drillhole with the sump area. The hole was cased for the entire length with 16-in. casing $\frac{3}{8}$ in. thick. Welding joints with acetylene saved $1 per foot in material cost, compared to purchasing screw couplings and specifying the casing with threaded instead of beveled ends. In addition there was a labor saving by reason of the greater number of men that would have been required to tighten the 16-in. screw couplings.

The 16-ft. bottom section of the casing was made to act as a coarse strainer. Its lower end was closed by welding a plate over it and 4,700 holes $\frac{3}{4}$ in. in diameter were drilled through the wall over an area extending from the bottom to 10 ft. above. When the casing was installed but still suspended from the tackle it was found that the borehole was so straight that the entire length of casing could be turned with the hand. Grouting was done only around a section near the top, which takes the entire weight of the casing.

The pump selected was a four-stage Deming unit of the semi-open impeller and water-lubricated type rated at 1,400 g.p.m. and powered by a 150-hp. motor. Regular specifications for the pump called for a 10-in. discharge column, but the mining company chose a 12-in. column to reduce the possibility of a drop to less than rated capacity in the event that scale or other deposit built up on the inside. Extra cost of the 12-in. pipe was but a small item.

Tests of the water indicated a slight acidity and experience has proved that ordinary steel pipe when used inside of the mine lasts eight or more years. Impellers and bowls of the pump are of bronze and bearing sections of the drive shaft are of stainless steel. The lowest bowl is about 2 ft. above the bottom of the coal and the intake is through a standard strainer attached below the bowl.

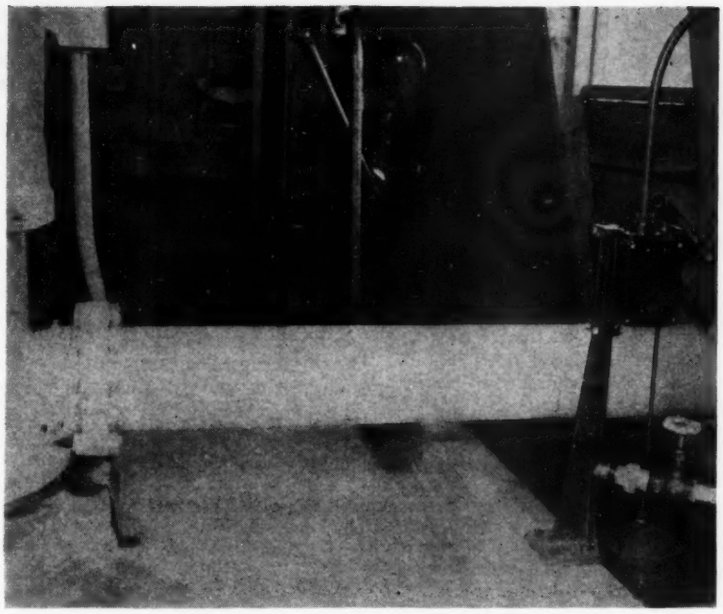
The vertical motor is a ball-bearing unit made by the U. S. Electrical Manufacturing Co. and is standard equipment for the Deming deepwell pump. It has a hollow shaft through which the solid drive shaft of the pump is carried, thus providing at the top a nut and drive clutch for convenient adjustment of the impeller setting. The name-plate rating of the motor is as follows: "150-hp., 2,200 volts, 3-phase, 60 cycle, 60-1,800 r.p.m., 36.9 amp., 40 deg. C." Although the motor is of the "auto-start" type, which permits of starting across the line, the coal company installed a manual compensator to reduce the initial peak.

In the pump head, at a point between the bottom of the motor and the stuffing box, a centrifugal ratchet device is mounted to prevent reversed rotation and overspeed by turbine action of the impellers while the water is receding in the column after power has been cut off the motor.

Temporary flooding of the water-lubricated rubber bearings when starting the pump is accomplished by connecting a short length of garden hose between a 52-gal. barrel and the pump. Usually about 25 gal. of water is used, although about 10 gal. probably would suffice. The barrel is refilled through the same hose when the pump begins delivering water, after which the barrel valve is closed and the hose disconnected.

Lowest Impeller Is 304 Ft. Below Ground Level at the Pumphouse.

The pump discharges into a concrete sump which drains by a small secondary



Float Switch at the Right Stops the Motor If the Discharge Volume Drops Much Below Normal.

outlet at the bottom and by a principal outlet at the top. The latter is a weir. Inside the pumphouse a float switch is installed in a compartment of the same sump. Most of the water leaves the sump over the weir, but when the pump stops delivering water the sump empties completely through the bottom drain in a few seconds. This arrangement, in combination with the float switch, provides automatic stopping of the motor to prevent damage to the drive shaft and its bearings in case the sump should be pumped dry or if for any other reason the water column is not kept well filled.

Test No. 1, shown in Table I, was made before final adjustment of the impeller level. Test No. 2 was conducted after the impellers had been moved down at the direction of the pump manufacturer's representative. The nut at the top of the motor was turned five-sixteenths of a revolution to effect the impeller adjustment, which for regular operation was left as in Test No. 2. The increase of 250 g.p.m. by lowering the impeller increased the motor input 10.8 hp. Because the pump is operated during off-peak hours the power cost amounts only to the energy cost. This energy falls in the block for which the rate is 1.1c. per kilowatt-hour.

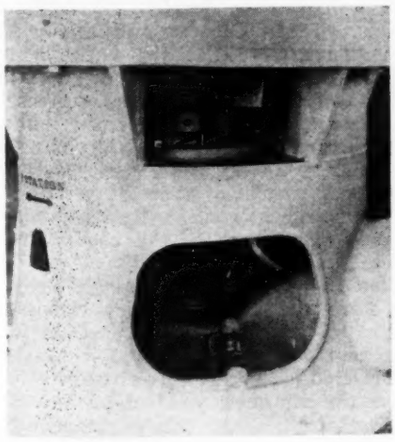
Electrical protective apparatus for the motor and pump consists of an overload relay in the Cutler-Hammer compensator and in addition a General Electric open-phase and phase-reversal relay acting in conjunction with the compensator release.

Table I—Pump Tests Before and After Final Adjustment of Impeller

	Test No. 1	Test No. 2
Seconds to deliver water to surface	65	62½
Power input to motor, kilowatts	121	129
Motor output, horsepower[1]	146.00	155.62
Water delivery measured by weir, g.p.m.[2]	1,435	1,684
Total lift, feet[3]	295	295
Estimated friction in discharge pipe, feet	3.6	4.0
Calculated total horsepower in water	108.05	124.72
Calculated bowl efficiency, per cent	77.45[4]	84.35[5]
Over-all efficiency, pump and motor, per cent	66.60	72.12

[1]Brake-horsepower calculated on the assumption that the motor operated at the guaranteed efficiency of 90 per cent.
[2]After deducting 5 per cent for possible imperfections in the weir.
[3]Exact water level in the mine could not be determined. Total lift was assumed to be 295 ft.
[4]Assuming 6.5 hp. lost in pump shaft friction.
[5]Assuming 7.7 hp. lost in pump shaft friction.

Pawls and Ratchet Wheel of the Non-Reversing Device Show Through Upper Hole in Pump Base.



Quality Rises With Adoption of Coal Saws

(Concluded from page 372)

and upon experience at neighboring mines. Cover over the mine varies from 100 to 1,000 ft. The mine is a drift operation opened in 1926 and is a leased property.

Slack percentages ($\frac{5}{8}$x0 in.) by the machine cutting and blasting method commonly employed in the Pocahontas No. 3 seam in the Winding Gulf district are said to average about 60. A test made at Kilpoca No. 3 soon after installation of the saws indicated 44 per cent $\frac{5}{8}$x0-in. size. On the basis of $\frac{3}{4}$x0-in. slack, mine officials calculate comparative percentages as follows: before installation of the saws, 55 per cent; after installation, 49 per cent.

Size percentages above $\frac{5}{8}$ in. now average approximately as follows: plus 6-in. lump, 12 per cent; 6x2½-in. egg, 13 per cent; 2½x1¼-in. stove, 10 per cent; 1¼x⅝-in. nut, 15 per cent. The corresponding percentages before installation of the saws are not known because for about two years prior the mine output was shipped as run-of-mine. Cuttings from the saws are considerably finer than from standard mining machines.

Under normal conditions, the sawing of the two horizontal cuts and the shear cut in a 20-ft. room requires between 16 and 26 minutes. The average per chain sharpening has been 5⅓ places and eighteen chains are in use with the three machines. Retipping the 84 bits of a chain with Stoodite by acetylene welding is done by the shop mechanic in 30 minutes. Retipping 13 chains in 5½ hours has been the best record. Stoodite material cost for one chain averages 13¾c. Bits with broken tips—few in number—are built up with special steel before the Stoodite is applied.

The air table at the tipple is still used about two hours per day or until the cars containing cuttings have been dumped. Putting the $\frac{5}{8}$x0-in. coal containing the cuttings over the air table is an added precaution against impurities that might otherwise be shipped if saw operators failed to clear the bone. The 2½x⅝-in. fraction of the sawed coal output also is being put through the wet washer as a precaution until loaders are thoroughly trained in the proper procedure of face preparation.

The Killarney Smokeless Coal Co. is headed by G. H. Nowlin, Jr., Lynchburg, Va., who also is president of the Premier Pocahontas Coal Co. and the Lynchburg Coal & Coke Co. R. R. Estill, Premier, W.Va., is general superintendent of the three operations and Frank Pendergrass is in local charge at Killarney mines. J. W. Daniel is general mine foreman and E. L. Booth is preparation manager and mining engineer.

NOTES

From Across the Sea

IN EUROPE, largely owing to the high price of oil and the consequent high price of petroleum coke, great efforts are being made to obtain what is termed "pure coal" for electrochemical purposes, even at the cost of selling the rest of the coal on a somewhat lower basis of purity than would otherwise be attempted. Moreover, "pure coal" is greatly desired for pulverized-coal engines, to prevent the scoring of the cylinder and the moving parts. Vitrain is found to be the purest form of coal, with an ash content sometimes of only 0.2 per cent, declared Maurice F. Bertrand, civil engineer of mines of the Ougrée-Marihaye Co., Belgium, in an article presented before the Institute of Fuel. He declared that during formation of the original gel, the inherent ash was partly dissolved by humic acid and partly displaced by sedimentation. But the cuticles (thin skin, or films, covering the surface of the plant body) and exines (coatings of spores), which are rich in silica, have not been freed of their inorganic constituents, hence some inherent ash remains.

Durain has a higher ash content than vitrain, and fusain a still higher percentage, the latter containing the colloidal clay of the water as well as its inherent mineral matter, and sometimes also iron salts reduced to pyrites, the quantity of which may be so great as to render it hard. Ash of vitrain is generally yellow-brown because of its high iron content; that of durain and fusain is gray, sometimes whitish. Vitrain ash resembles a sponge, revealing the original cellular structure and showing characteristic shrinkage clefts, whereas incinerated fusain preserves its characteristic appearance of polyhedric cells.

Coal contains in concentrations exceeding 0.01 per cent: boron, chromium, cobalt, gallium, germanium, tin, molybdenum, beryllium, scandium, yttrium, silver, gold and platinum. Though the composition of the ash has much bearing on its fusion temperature and on the catalytic effect and may be detrimental to its sale, the constituents are so minute that separation, even in the laboratory, is difficult. It is impossible to attempt, on the basis of present knowledge, the separation of these impurities, and the separation of vitrain and durain would not change the proportion of constituents much, for both, at least in anthracite, show similar composition both by X-ray analysis and by extraction with anthracene oils.

Electrometallurgy of aluminum and light metals, declared M. Bertrand, requires anodes with less than 1 per cent of ash or, more exactly, less than 0.5 per cent of iron plus silicon, because the metal must have a purity of 99.5 per cent if corrosion is to be prevented. The anodes are produced exclusively from oil coke which contains 8 to 10 per cent of volatile matter, 0.5 per cent of ash and up to 0.5 per cent of common salt. (American petroleum coke, it may be said, has variant quantities of ash, certain samples from a Knowles oven having 1.8 per cent; from a cracking still, 1.5 per cent; and from a Shell still, 0.8 per cent.) The coke must be heated to 1,400 deg. C. before it can be used, and the salt it contains combines with refractories in the kilns, causing rapid corrosion.

Pitch coke is expensive in Europe because two tons of pitch has to be used per ton of coke, and almost all the pitch can be and indeed is being used on roads and for briquetting. But anodes can be made of "pure coal" with less than 1 per cent of ash and 1 per cent of sulphur. Coking coal with 0.6 per cent ash gives after coking a light homogeneous coke which after rough crushing is used directly for the manufacture of electrodes. From lean coals and anthracite a product is obtained that could be freed of volatile matter as is petroleum coke. This product is homogeneous and entirely free from salt. "Pure coal," according to M. Bertrand, will be used (1) in producers to supply gas to replace gasoline, producers using this kind of fuel being trouble-proof, making operation in trucks unobjectionable and cleanly; (2) in internal-combustion engines, as colloidal fuel; (3) in hydrogenation because of ease of operation and (4) in the production of high-grade electrodes for electrometallurgical processes.

For washing coals to obtain maximum purity, Sophia Jacoba, in the Rhineland, has used a suspension of finely ground baryta (barium monoxide) stabilized by colloidal clay, but, though the medium can be kept in quiet suspension, it is too viscous to separate extremely fine coal from its impurity, says M. Bertrand. On coal of middle size he advocates the use of a Rhéolaveur, followed by a sludge washer, draining tables, Zimmer tables and flotation in a calcium-chloride solution, the coal being impregnated in a weak solution, then in one of medium strength and then in a strong solution. It is then washed in the strong solution and the impurities are separated, after which each passes to a strong solution, a medium solution and a weak solution and finally into hot water, removing all the calcium chloride with minimum loss of the chloride. Evaporation of the water in the solution to restore its density is said not to be necessary with this method of operation.

The ash of petroleum coke during its carbonization increases 10 per cent, bringing its percentage to 0.55, whereas the ash of the coke of the "pure coal" made by this method is 0.6 per cent. However, 25 to 30 per cent of the ash is alumina, which does not interfere with the manufacturing process, the only foreign elements to be avoided being iron and silicon, which together must be less than 0.5 per cent. Produced in byproduct ovens the coke is hard, compact and will ring.

Because the pure coal on coking becomes partially converted into graphite by the cracking of the hydrocarbons, the electrodes made from it by crushing and mixing with pitch are more conductive of electricity and less subject to combustion than those made from petroleum. They are also more porous than pitch-coke electrodes. In the making of electrodes very lean coal, rich in vitrain and low in inherent ash, can be utilized. The product has about three times the resistance of graphite made by the Acheson method, which is alpha graphite, and almost four times the resistance of beta graphite from Ceylon.

In discussion D. T. Davies, Fuel Research Station, said that clarain was cleaner than vitrain in some cases, though the order vitrain, clarain, durain and fusain, the first being the cleanest, usually held. He had found durain with only 0.8 to 0.9 per cent ash, all the other associated coal bodies having a higher ash percentage. However, where these were used, difficulty might result from the use of calcium chloride, for the salt might be so strongly absorbed that it would be difficult to remove. Impractically large quantities of water had failed in some cases to effect its removal.

M. Bertrand had shown curves where the quantity of ash, for instance, was greater when the coal was cleaned at a density of 1.266 than when cleaned at a density of 1.274. Another coal showed more ash when cleaned at a density of 1.324 than when cleaned at a density of 1.326. Dr. Davies said this was true of many British coals. It has been found that not only the ash but also the hydrogen increased with the decrease in density. Some material, largely pure spores, could be isolated having an ash content of about 2 per cent and a hydrogen content of about 8½ per cent. The hydrogen content lightened the spores more than the ash content increased their weight.

Dr. Davies thought it might be better to obtain the pure coal by less elaboration. If an average coal, containing 5 per cent of ash, were treated with calcium chloride of the correct density to give the uttermost yield of ultra-clean coal, that ultra-clean coal might contain

1 per cent of ash and the small quantity of middlings might contain 10 or 12 per cent; but if only 70 to 80 per cent of the possible yield of ultra-clean coal were recovered, the middlings might constitute a commercial product of about 7 per cent of ash.

If "pure coal" is to be obtained by such elaborate methods, said John Roberts, consulting engineer, it would be better not to attempt it but to get natural coal from New Zealand which had 0.2 per cent of ash, free from durain and fusain. Coal of this cleanness was being produced in Germany for the coal-dust engine. "Pure coal" can be produced on a concentrating table or on a jig, said L. W. Needham, as he and A. A. Hirst had demonstrated at Birmingham University.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Industrial Planning Under Codes, by G. B. Galloway and associates. Harper & Brothers, New York. 428 pp., 6¼x9½ in. Price, $4.

The editor of this symposium, the assistant deputy administrator of NRA, in his preface declares that the effort of the authors "has been to use the experience of representative industries under the NRA to put some flesh on the dry bones of general discussion and to infuse real life into abstractions," but the general principles of industrial planning are more appealing than a record of any industry's actual methods. For this reason, despite these aspersions of the editor, his own part of the book—the first 113 pages—probably will be found the most interesting, with its description of the concept of industrial planning, industrial control before NRA, the NRA and industrial planning, and the techniques of code management. He is careful to point out that his subject does not cover national planning and that "its frame of reference is to the capitalistic economic order."

Code operations in fifteen industrial groups are reviewed by an equal number of commentators. The groups selected for study are: cotton textiles, woolens and worsteds, iron and steel, bituminous coal, petroleum, lumber and timber products, chemical manufacturing, pulp and paper, rubber, electrical manufacturing, machine tools, automobile manufacturing, hats, construction and the retail trade. Jack Levin, formerly chief of legal research, NRA, covers the legal basis for industrial planning; Mr. Galloway, small business under NRA; and L. L. Lorwin, formerly with the Brookings Institution, writes on industrial planning and "fair competition."

Why and how the bituminous coal industry was developed beyond national needs is described by Sydney A. Hale in the opening paragraphs of the chapter on the coal industry under NRA. Next the familiar story of why consumption declined is retold and with it the plans put forth by the industry itself to meet the difficulties of excessive competition. The feverish days of code planning are revived and the major changes under code operation are summarized. "The fact," concludes Mr. Hale, "that the code has offered no direct help in solving the problem of overdevelopment is not so much a criticism of the code as a statement of the intent and limitations of the NIRA. If the code in this respect has fallen far short of providing permanent stabilization—and there can be no binding assurance of such stabilization so long as developed productive capacities so greatly exceed consumption demands—the code, by compelling closer cooperation between the competing operators in working out their day-to-day problems, has set the stage for the orderly consideration of broader plans for the future."—R. Dawson Hall.

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Mines, Machines and Men, by W. D. Stewart. P. S. King & Son, Ltd., London, England. 180 pp., 5x7½ in. Price, $1.50 net.

With a background of experience as part-time lecturer in economics for the Workers' Educational Association, this Oxford man details the coal situation in Great Britain, without, however, affording much light as to its solution. A new psychology seems to be his concluding hope, but a business which has to rid itself of a large excess of men, has lost much of its foreign trade and finds its domestic demands decreasing seems to need liquidation rather than psychology. No doses of liberalism and mutual forbearance, however large, can help the invalid to sit up in bed, much less do handsprings.

Mr. Stewart starts with a survey of the changing structure and conditions of work in the industry since 1900 and in his treatment of the subject shows more intimate knowledge than most commentators. He is against mechanization, sums up its hidden costs and declares he doubts if it pays; the answer to which is that the use of mechanism is growing and that if it didn't pay it wouldn't progress.

The author questions the value of larger mines and quotes the evidence of the Royal Commission that 307 mines producing less than 5,000 to 200,000 tons a year produced 1,817 lb. per man-shift at a loss of 1.21 shillings per ton, and that eight mines producing 2,000,000 tons and over annually produced 2,213 lb. per man-shift at a profit of 0.28 shilling per ton; but quite justifiably he declares that this may prove that favorable conditions produce and favor the construction of big mines and a healthful balance sheet, and not that big mines furnish favorable conditions for effective production and profits.

He believes mechanization has accentuated bronchitis and nystagmus, and as to the first quotes Dr. J. S. Haldane, who says that "deaths among old colliers were not to any considerable extent due to dust inhalation but to the strain on the lungs of an occupation involving much muscular exertion." To this Mr. Stewart would add that it may be due to the exertion of breathing while working hard in a dusty atmosphere. However, to the mind of the reviewer, experience in excessively dusty mines, where men became sickly from dust in a few weeks, would suggest that the more direct evil of an overdose of coal dust should not thus be palliated.

Nystagmus has increased due to the use of the cutting machine, says Mr. Stewart, despite the promise that the introduction of machinery would limit its occurrence. Nystagmus, he says, increased in Scotland while the application of coal-face machinery rose from 19.7 per cent in 1903 to 58.9 per cent in 1928. Though in this he agrees again with the better known medical authorities and holds that bad lighting causes nystagmus, he quotes Dr. C. S. Myers, who says that, as it is a neurasthenic affliction, noise and vibration are partial causes for its occurrence. To these Mr. Stewart would add increased fatigue and apprehension of danger. Why, then, do we not have nystagmus in the United States?

Following these studies, legislation, strikes, wage payments and the minimum wage are considered. The conclusion is that the British miner is worse off than at the beginning of the century, which probably is true. With a big increase of miners during the War and after the Armistice, and with both home and foreign markets curtailed, what else was to be expected? If the industry were smaller, the condition would be liquidated by capital and labor without any public action or outcry, as many other industries have been, but the industry being big, the situation has entered into politics and become a matter of public record and national clamor.—R. Dawson Hall.

OPERATING IDEAS

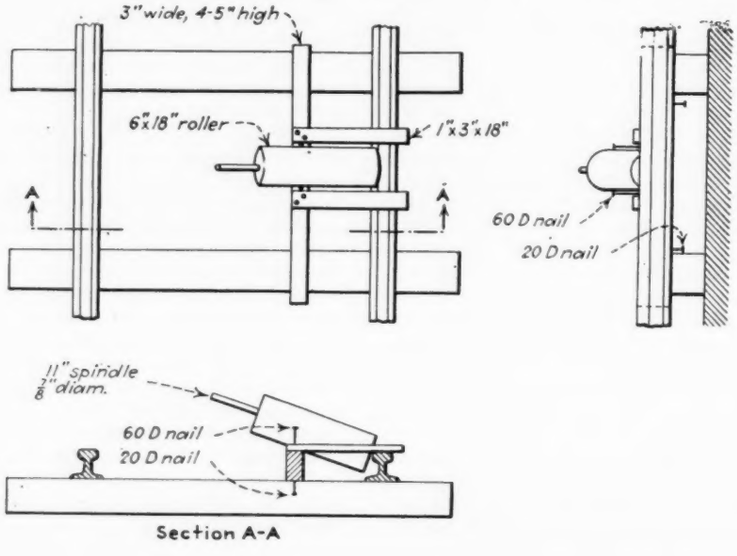
From Production, Electrical and Mechanical Men

Cradle Aids Replacement Of Rope Rollers

Without the use of auxiliary holding equipment, removing spindles from worn-out rope rollers or driving spindles into new rollers may be a difficult procedure, particularly on pitching roads, writes Charles W. Watkins, Kingston, Pa. Mr. Watkins therefore proposes the use of the cradle shown in the accompanying illustration. With this cradle, he points out, both the repairman's hands are free to use axe or sledge and he can stand firmly on his feet, both of which are out of the way of blows. Also, if the process of driving or removing a spindle is interrupted for any reason, the roller is held in working position.

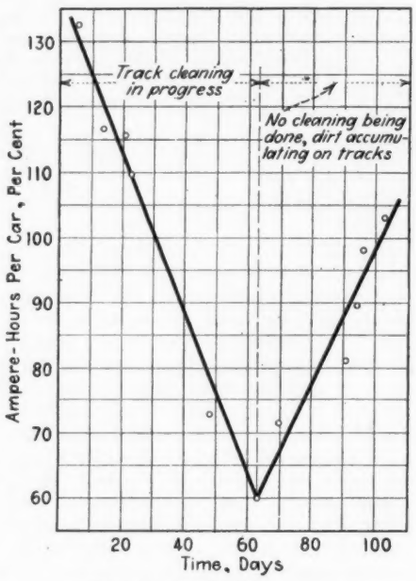
The cradle consists of a piece of timber 3 in. wide, 4 or 5 in. high and long enough to give a proper bearing on two ties. Two 60D nails are driven in one edge about 2 in., leaving 4 in. projecting to hold the roller. Additional support for the roller is given by two 1x3-in. strips of wood 18 in. long nailed in place next to the 60D nails. The ends of these strips rest on the top of the rail, as shown. The assembly is prevented from moving from position or sliding down the pitch by 20D nails (see figure) driven in about half way. These engage the edges of the ties and therefore act as stops. The angle at which the roller lies is adjusted by moving the main member toward or away from the rail. To reduce the difficulty and labor of carrying a single cradle from place to place, Mr. Watkins suggests that one be kept at each point where renewal rollers are stored.

Details of Cradle for Holding Rope Rollers. Dimensions Shown Can be Modified to Fit Other Roller Sizes or Meet Other Variations in Conditions.



Battery Duty Cut 60 Per Cent By Cleaning Tracks

Keeping tracks clean as compared to allowing dirt to accumulate makes it possible to use a battery of 50 per cent smaller capacity, according to test results submitted by B. F. Grimm, consulting electrical engineer, Koppers Coal & Transportation Co., Pittsburgh, Pa. The result of a 103-day test on a battery locomotive is set forth by the accompanying graph. Over a 62-day period during which tracks were being cleaned of accumulated dirt the ampere-hour consumption per car dropped from 134 per cent to 60 per cent. Then cleaning was suspended for 41 days, and the ampere-hours increased to 103 per cent.



Relation of Track Dirt and Battery Discharge

This comparison alone can fully explain why certain companies, as compared to others, obtain so much higher performance efficiency from battery locomotives and at lower cost. Other conditions, such as maintenance methods and supervision over motormen, could be equally important factors.

Split-Yoke Ammeter Test Indicates Accuracy

Sufficient accuracy for practically all operating tests inside the mines is afforded by the split-yoke type of ammeter which indicates direct as well as alternating current and in which the magnetic yoke is an integral part of the instrument. This utility characteristic of the meter allows it to be used to measure flow in d.c. power lines without disturbing connections or insulation, and the relative accuracy cited is indicated by an approximate comparative test made by A. F. Finneran, electrical engineer, Pond Creek Pocahontas Co., Bartley, W. Va.

As a standard for comparison, simultane-

Table I—Comparison of Two Meters at Four Different Current Values

Current	Amperes, Standard Meter	Amperes, Split-Yoke Meter
A	1.56	1.30
B	3.25	2.55
C	4.80	3.85
D	33.25	33.00

Table II—Test of Split-Yoke Meter Showing Effect of Paper Inserted Between Faces of the Yoke

	Amperes
Normal reading	32.5
One thickness paper—0.0033 in.	31.0
Three thicknesses paper—total 0.0099 in.	
First reading	29.0
Second reading	28.5
Six thicknesses paper—total 0.0198 in.	27.0

ous readings were taken with a standard ammeter of known accuracy. As indicated by Table I, the split-yoke meter read practically as high as the standard with a current of 33¼ amp. Another test was made to determine the effect on accuracy of slight bits of dirt or grease sticking to the faces of the magnetic yoke and thus preventing their coming into intimate contact with the conductor. Referring to Table II, one thickness of ordinary note paper inserted between the faces reduced the reading less than 5 per cent.

Bearing Pullers

For removing the roller bearings from Joy armatures, Walter Baum, O'Fallon, Ill., offers the pullers shown in the accompanying illustrations. These are made in pairs for use on the front and back ends of the armature, respectively, and are similar except for the length of the barrels. One long puller with a long screw could be used on both ends, but might result in difficulties in working on the front end of the armature in the machine.

The short puller is shown in Fig. 1. Length of the barrel, made of 2½-in. pipe bored out to slide over the armature shaft, is 7 in. for the particular loaders in use. It is welded to a 6-in. square base with four ⅝-in. holes to fit the ⅝-in. studs in the bearing retainer. Details of the long puller with 11-in. barrel are shown in Fig. 2. The nut carrying the screw is welded or brazed in the end of the pipe opposite the base. The T-member, which fits inside the pipe after it is bored out, is fitted with a ½-in. pin to prevent it from turning, and is bored out to $1\frac{5}{16}$ in. to fit over the threads on the armature shaft. The T-member also prevents damage to the shaft centers—an important point.

Fig. 1—Short Puller in Place

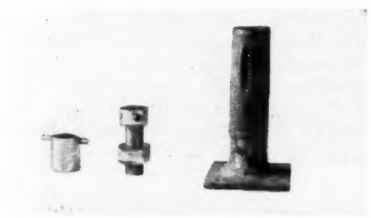


Fig. 2—Details of Long Puller

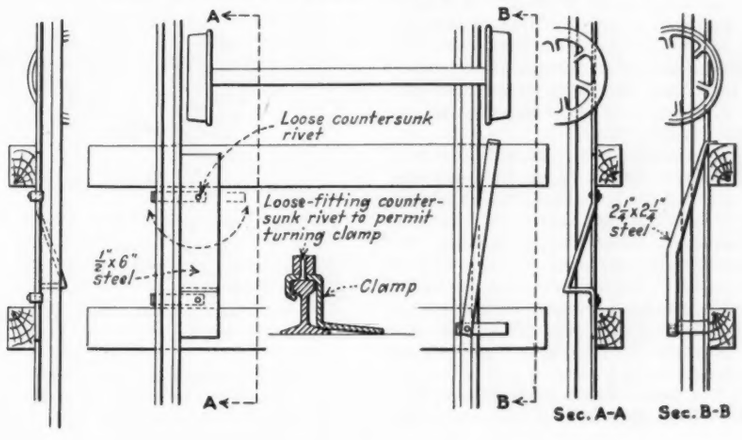
Cooler

When a problem pops up around a coal mine, it can generate considerable heat if a solution is not available within a reasonable time. In such times of stress, the man with an immediate answer always remains the coolest. Such a man, whether employed in the operating, electrical, mechanical or safety department, relies not only on his own experience but also on what he can learn from the experience of others. This department is one source of information on the other fellow's method of meeting the situation, and here also is where your ideas belong. So send them in. Each acceptable one will bring its sponsor $5 or more from *Coal Age*.

Rerailer

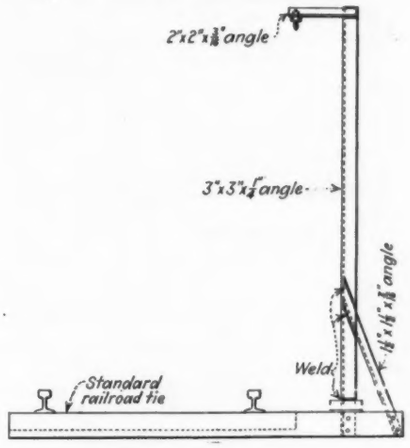
For carrying on locomotives, Burrell L. Curry, Wyano, Pa., offers the rerailer shown in the accompanying illustration, which is made in two separate parts for use on the two rails of the track. Quick attachment, reduction in bulk and elimination of any attention when placed on the rails are advantages pointed out by Mr. Curry.

Rerailer Applied to Track, Showing Construction Details



Trolley Supports Shift With Track

To prevent track shifting away from the trolley wire on outside hauls at the New Jellico mine of the New Jellico Coal Co., Morley, Tenn., the system shown in the accompanying figure has been adopted. With this system, the trolley support is made a part of the track and moves with it, thus keeping the trolley wire in position at all times, even where super-elevation is employed.



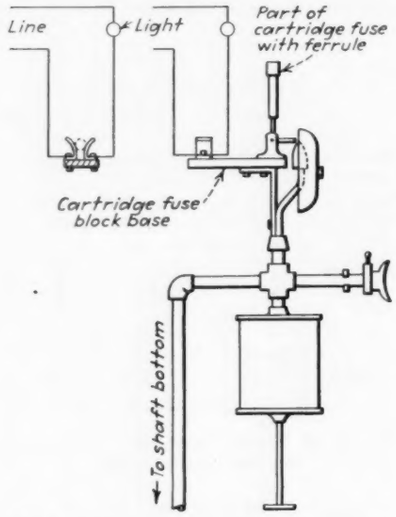
Details of Trolley Supports Employed at the New Jellico Mine.

Trolley supports are made of angles welded together and bolted to standard railroad ties inserted in the track at the proper intervals. To keep the supports in position, braces are installed as indicated.

Auxiliary Signal Added To Buffer-Bell

Addition of a light-signal circuit to the ordinary pneumatic hoisting signal will allow the night engineer to be summoned from any part of the plant and thereby release him for other duties, writes Walter Iman, Kitzmiller, Md. Such a signal can be

made from scrap electrical parts, as it requires primarily the base of a discarded cartridge-fuse block, part of a burned-out cartridge fuse with ferrule attached, and a few screws and pieces of light metal bent into angles. These are assembled as shown, and when the signal is operated from the shaft bottom, the striker as it moves up to ring the bell also strikes the lever attached to the fuse part, overbalancing it and causing the ferrule to drop onto the contacts and close the light circuit. With this attachment, says Mr. Iman, it is not necessary for the night hoistman to stay in the engine room all the time and he is



Light Circuit Added to Pneumatic Hoist Signal Releases Night Engineer for Other Duties

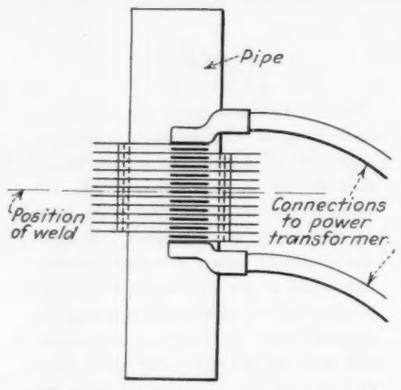
therefore able to charge lamps, dry sand, watch the premises and perform other duties, as the lights, which should be placed where they can be seen from any part of the plant, will notify him of any calls from the shaft bottom.

Pipe Welds Strengthened by Electrical Annealing

Steam temperatures above 700 deg. F. are now being employed at coal-mine power plants and the power engineers have expressed their inability to locate comprehensive practical data concerning piping assemblies for high pressures and high temperatures. Annealing by electrical induction has been added recently to the technique of securing pipe welds of higher strength.

This annealing was employed when new high-pressure boilers and generators were installed at the Connors Creek plant of the Detroit Edison Co., where pipe-to-valve connections as well as the pipe section connections are of welded construction. To relieve the stress in the weld the temperature of the metal is brought to 1,100 deg. F. by an induced 60-cycle current which circulates through the weld.

A coil of heavy flat conductors hinged on one side to permit assembly over the



Coil Encircling the Pipe at the Weld

pipe serves as the current-inducing equipment. An insulating sleeve separates the coil from the pipe. This method of annealing pipe welds was given brief mention in a power-plant rehabilitation paper written by R. E. Greene, of the Detroit Edison Co., and which appeared in the June, 1935, issue of *Electrical Engineering*, published by the American Institute of Electrical Engineers. The steam pressure in this Connors Creek plant is 600 lb. per square inch and the temperature is 850 deg. F.

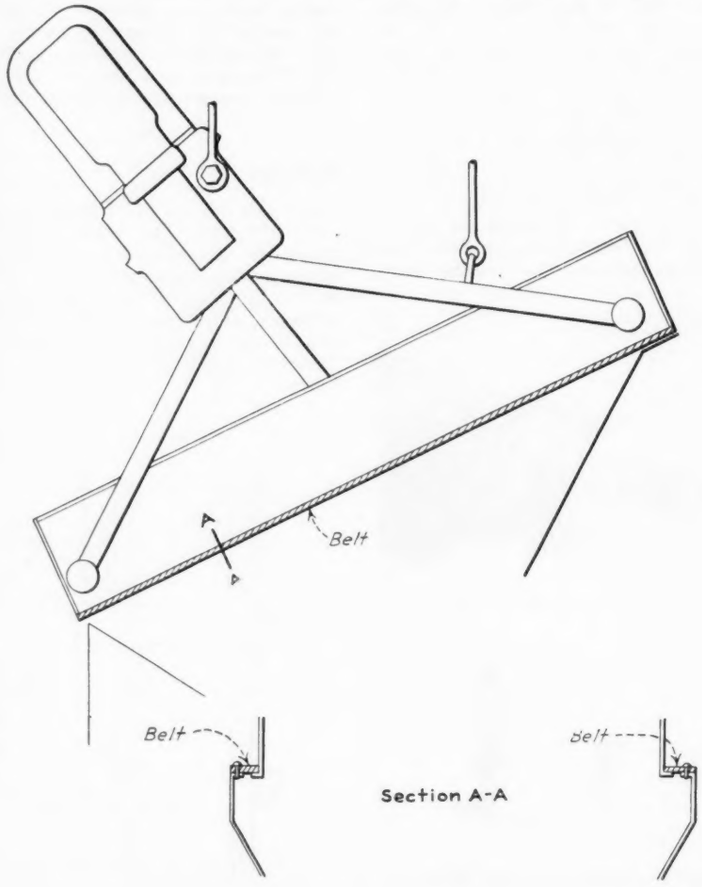
Conveyor Belting Constitutes Dust Seal for Screens

Instead of the usual flexible connection of canvas or other fabric, the dust-tight inclosure between an electric vibrating screen and its hopper can be made of strips cut from conveyor belting taken out of regular service because of wear. Strips of belting were thus applied between vibrators and hoppers at an installation of fine-coal screens made recently at Mine No. 3 of the Pond Creek Pocahontas Co., Bartley, W. Va.

Three Jeffrey-Traylor 4x7-ft. single-deck "Conveyanscreen" units were installed. One is mounted on a pitch of 15 deg. and the other two on pitches of 18 deg. All three are engaged in separating ¼x0-in. material from the 1½x0-in. size prior to washing the latter.

As indicated by the drawing, the strips of belting are fastened rigidly to the sides of the hopper but are in loose contact with the bottom flange, or angle, of the screen frame. Amplitude of vibration of the frame in a direction perpendicular to the strip of belting is so slight that the eye can detect no opening between the frame and belting when the unit is in operation. Judging from the service of several months, the surface wear on the frame and belting is so slight as to be practically of no consequence.

Side View of Screen and Section of Bottom Edges Showing Belt Seals



WORD FROM THE FIELD

Congress Passes TVA Bill With Minor Changes

President Roosevelt's power program emerged comparatively unscathed when the conference report on the TVA act was passed by both houses of Congress Aug. 21. The House vote was 259 to 90, but there was no record vote in the Senate. As adopted, the measure authorizes TVA to sell surplus power, a right denied by Judge Grubb, in Federal District Court at Birmingham, Ala., but subsequently overruled by the Court of Appeals at New Orleans, La.

The bond-issuing power of the authority remains at $50,000,000, although the administration sought to have it increased to $100,000,000. TVA is given wider authority, however, to lend funds to States and municipalities for the purchase of power-distributing systems. A House requirement that TVA attempt to purchase the transmission lines of private companies before building new ones was killed, allowing TVA to duplicate existing lines.

Other powers granted to TVA by the bill include: to provide a 9-ft. channel in the Tennessee River from Knoxville to its mouth; to regulate power resale rate schedules; to make purchases without competitive bidding in emergencies; and to pass on private dams and power developments on the Tennessee and its tributaries that might affect the TVA plan for "unified development" of the basin.

In auditing TVA books, Comptroller General McCarl will have to use his own funds, and in submitting a report on TVA operations he is required first to transmit it to TVA, which is allowed to attach its own report to the Comptroller General's, so that Congress will receive both at the same time.

RFC Loan for Scranton Coal

Negotiations were concluded last month for a loan of $650,000 to the Scranton Coal Co. by the Reconstruction Finance Corporation. This is the largest loan which has been made by this federal agency to any coal company. The funds, when advanced, will be used to provide additional working capital for the mining company and to pay past due taxes on a compromise basis worked out between the coal company and the local taxing authorities in Lackawanna County, Pennsylvania. Other creditors, stated James H. Pierce, chairman of the Scranton company board, have agreed to subordinate their claims to facilitate the granting of the RFC loan.

The negotiations for additional working capital have been in progress for over a year. Before taking favorable

action, RFC engaged Eavenson, Alford & Hicks to make an exhaustive study of the data submitted by the Scranton Coal Co. officials. As a result of this investigation, said Mr. Pierce, RFC "was convinced that the equity behind the loan was sufficient and that, under the new financial set-up, the earning power would be sufficient to meet all sinking-fund requirements." In addition, RFC took into consideration the serious labor condition in the anthracite field, realizing that the coal companies are now paying and in the past always have paid good wages and that these large payrolls have provided a shock against the depression not only to the miners themselves but to the merchants and others engaged in business throughout the district.

"RFC," added Mr. Pierce, "is particularly pleased with the tax compromise, as it indicated a real desire on the part of local authorities to make a contribution toward the maintenance of this enterprise. All of those who participated in any way" in the negotiations, he concluded, "should feel gratified that their efforts have now been rewarded in the maintenance of employment for approximately 1,600 men."

L. J. Martin Heads NRA

Lawrence J. Martin, of Aldie, Va., was named by President Roosevelt on Aug. 24 to succeed James O'Neill, of New York City, as acting administrator of NRA. Mr. Martin formerly was general superintendent of the artificial silk mills of the Tubize-Chatillon Corporation, Hopewell, Va. Mr. O'Neill, vice-president of the Guaranty Trust Co., New York City, who was appointed June 16 to head the skeletonized recovery administration, announced that he would retire from the office nearly a month ago.

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PERMISSIBLE PLATES ISSUED

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Jeffrey Mfg. Co.; Type 44-D loading machine; two 15-hp. motors, 250-500 volts, d.c.; Approvals 290 and 290A; July 3.

Jeffrey Mfg. Co.; Type 44-D loading machine; two 15-hp. motors, 415 volts, a.c.; Approval 291A; July 3.

Social Security Bill Signed

Terming it "the cornerstone in a structure which is being built, but is by no means complete," President Roosevelt signed the Wagner-Lewis social security bill on Aug. 14. The measure provides a broad program of unemployment insurance, old-age pensions, government aid to needy and dependent mothers and children, the blind and the ill. Introduced seven months ago (February *Coal Age*, p. 95), the act received final Congressional approval in the Senate on Aug. 9 without a record vote.

The bill had been tied up in conference since June 19, due largely to the efforts of Senator Clark to retain his amendment permitting continuance of private industrial pension systems. This amendment was eliminated, however, before final approval of the measure.

Administration of the measure will be in the hands of a Social Security Board, an independent body of three members, which the President named on Aug. 23. John G. Winant, former Republican Governor of New Hampshire, chairman, was chosen for six years; Arthur J. Altmeyer, Wisconsin, second assistant Secretary of Labor, was appointed to the board to serve until 1939, and Vincent M. Miles, Arkansas attorney, was named to serve until 1937.

New Preparation Facilities

New contracts and construction of preparation facilities were reported as follows in August:

Binkley Mining Co., Seeleyville, Ind., contract closed with McNally-Pittsburg Mfg. Corporation for five-track tipple with crushing and rescreening facilities at new strip mine; to be completed in November.

Crummies Creek Coal Co., Crummies, Ky.; contract closed with Morrow Mfg. Co. for rescreening plant with a capacity of 175 tons of minus 2-in. coal per hour. Equipment includes conveyors, high-speed and vibrating screens, spiral "lowerators," feeders and jigger screens under bins, and loading chutes; to be completed Oct. 1.

Glen Alden Coal Co., Scranton, Pa.; contract closed with the Koppers-Rheolaveur Co. for nine 8-ft.-diameter Menzies cone separators for Bliss breaker, Nanticoke, Pa., which has a capacity of 3,000 tons per day. The new separators, which will replace jigs, will be employed to clean part of the stove and all the nut to barley sizes, inclusive. Installation to be completed in approximately three months.

Mine B Coal Co., Springfield, Ill.; contract closed with Jeffrey Mfg. Co. for five-track tipple including conveyor from shaft headframe, shaker screens, picking tables, loading booms and auxiliary con-

veyors; capacity, 300 net tons per hour.

NORTHWESTERN IMPROVEMENT Co., Roslyn, Wash.; contract closed with American Coal Cleaning Corporation for air-cleaning equipment for ⅜x0-in. coal, including one Type "Y" Size RB American pneumatic separator and American metallic dust-collecting equipment; capacity, 50 tons per hour; to be completed Oct. 1.

PITTSBURGH COAL Co., South Hills mine, Pittsburgh, Pa.; contract closed with Morrow Mfg. Co. for apron feeder, four-grade shaker screens, rescreen conveyor, bucket elevator and loading chutes with rescreens; to be installed by Oct. 1.

ROSLYN-CASCADE COAL Co., Roslyn, Wash.; contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Norton automatic washery for cleaning and loading 2-in. screenings; capacity, 100 tons per hour; to be completed in October.

SULLIVAN TRAIL COAL Co., Old Forge, Pa.; contract closed with the Koppers-Rheolaveur Co. for two Menzies cone separators for new breaker at Pittston, Pa., with a capacity of 1,200 tons per day. Breaker design is in charge of W. C. Menzies, Scranton, Pa., and one separator, 12 ft. in diameter, will clean egg to pea, inclusive, while the other, 10 ft. in diameter, will clean buckwheat, rice and barley. Installation to be completed in three to four months.

Automatic Coal Heat Show Reopens This Month

After an August vacation, the "Smokeless Automatic Heat Show" sponsored by the Coal Exchange of St. Louis, Mo., reopens this month and probably will be continued for the rest of the year. The "show," a display of automatic coal-burning equipment, was first opened in June. During that month an average of 1,000 people a day stepped into the showroom to investigate modern home heating. In July, the average daily attendance rose to nearly 2,000. Sponsoring coal men are looking forward to a still greater public response to the exhibit during the fall and winter months.

When the idea of a show was first broached by the coal men last spring, the stoker interests were somewhat lukewarm and doubted whether the plan could be justified financially. Eight stoker companies, however, agreed to contribute $50 each per month for a two-month trial and the Coal Exchange agreed to furnish the additional $3,200 needed to run the exhibition for that period and to underwrite the entire venture. A prominent downtown location in the heart of the retail shopping district was secured on a temporary lease at a nominal rent and the show was thrown open to the public on May 24 and ran until July 13.

Each exhibitor was allowed to display two domestic stokers and five of the companies had their stokers working under actual operating conditions. Over 60 sales were made during the first 43 days the show was running and hundreds of leads for later follow-up were secured. The stokers exhibited were the Black Servant, H.& H. Fire Tender, Hercules, Iron Fireman, Liberty, Link-Belt, Stokol and Whiting. Several manufacturers of accessory equipment also participated, exhibiting ventilating fans, motors, insulation, thermostats and controls, soot removers, smoke alarms, boilers and air-conditioning units.

Chicago coal and allied interests also plan to enter the picture late this month with the "Modern Coal Heating Exposition," to be held in the Straus Building, on Michigan Avenue, from Sept. 28 to Oct. 13. The Chicago Coal Merchants' Association is sponsoring this exhibit. Coal producers, sales agents, railroads, stoker and allied equipment manufacturers will be represented at the exposition with special displays.

A group of St. Louis retailers recently organized the Automatic Coal Heating Association to push the sale of a locally manufactured unit known as the Stok-a-Fire stoker. This burner, which has a capacity of 60 lb. of coal per hour, is being sold installed with electric controls for $179. The equipment is offered without down payment and the purchaser is given a maximum of three years in which to complete payments in monthly instalments of $5.73. Ewald Smith, Century Coal Co., is president of the association; John Haas, John Haas Co., is secretary-treasurer; and I. H. Bernard is director of the organization. Fifteen retailers in St. Louis County are now members of the association.

PRORATING CURBS BOOTLEGGING

EQUALIZATION of working time and opportunity seems to be the solution to curbing the bootleg mining evil in the anthracite region of Pennsylvania. Under the terms of an arrangement being worked out by the Susquehanna Collieries Co. bootleg miners in the Shamokin sector have agreed that as soon as they receive work from the company they will cease outlaw operations and be satisfied with the rate of work given them. The company does not insist that they stop bootleg mining until they obtain employment, but indicates that every effort is being made to place the men in order to eliminate this destructive competition.

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Anthracite Engineers to Meet

Inspection trips plus technical discussions of anthracite engineering and operating problems will feature a joint meeting of engineers at Wilkes-Barre, Pa., Sept. 28, under the sponsorship of the American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers and the Wilkes-Barre Chamber of Commerce. From 9 a.m. to 5 p.m., those in attendance have a choice of inspection trips to the Dorrance mine and breaker of the Lehigh Valley Coal Co.; uphill-shaker-chute sections at the Delaware colliery of the Hudson Coal Co.; and the Stanton colliery power plant of the Glen Alden Coal Co.

At the dinner meeting in the evening, the following papers will be offered: "Engineering in the Anthracite Industry," Frank H. Wagner, vice-president and general manager, Lehigh Valley Coal Co.; "The Anthracite Industry," James H. Pierce, James H. Pierce & Co.; and "Electric Utility Service to the Anthracite Industry," N. G. Reinicker, vice-president and general manager, Pennsylvania Power & Light Co. The committee on arrangements is headed by W. H. Lesser, James H. Pierce & Co., representing the A.I.E.E. with L. Z. Ludorf. Committee members representing the other organizations are: A.S.M.E., B. F. Rogers and R. Z. Berninger; A.I.M.E., John C. Haddock, H. W. Montz and E. L. Dana; Chamber of Commerce, Howard Strong and H. A. Bolender.

Receivers Plan to Refinance Kingston Coal Co.

Plans to resume operations at Kingston Coal Co., which was placed in equity receivership last June (*Coal Age*, July, 1935, p. 315), are being pushed by James H. Pierce and Walter Oliver, receivers for this anthracite producing company. General creditors of the company have been asked to accept 20c. on the dollar in full settlement of their claims, which total $254,979.66. The preferred claims —including $164,677.89 in taxes, $151,-991.49 in wage claims and $81,666.73 in accrued compensation liability — total $414,588.05. If the company were liquidated, say the receivers, it is doubtful if the general creditors would receive anything on their claims.

Application has been made to the Reconstruction Finance Corporation for a loan which will enable the receivers to refinance the property and resume operations. RFC officials have indicated that they cannot authorize a loan sufficiently large to take care of all the company's indebtedness, but proposals under discussion do contemplate the 20 per cent settlement with general creditors. The receivers also have negotiated a new wage scale with Kingston employees, "which undoubtedly will contribute largely to the future success of the company." Lessors have agreed to waive minimum royalty for the period of the proposed financing.

When the general creditors accept the settlement basis offered last month, declare Messrs. Pierce and Oliver, "we will then have met all the conditions imposed by RFC officials and, so far as we are now able to ascertain, will be in a position to receive a government loan sufficient to enable us to reopen the mines and continue their operation. This, if accomplished, will result in the reemployment by us of 1,000 men, with the resultant payroll of $2,500,000 per annum and a demand for material and supplies of approximately $600,000 per annum."

Research Studies Launched

Studies of hydrogenation for conversion of bituminous coal dust to fuel oil, of the characteristics of coals for underfeed stokers and of the chemical treatment of coals are being sponsored by Bituminous Coal Research, Inc. The first-named study, which is under way at Pennsylvania State College, has as its objective a distillate suitable for household burners. The problem covers these phases: development of a laboratory-

scale hydrogenation system; preliminary study of coals with respect to analysis, physical and chemical properties, ash, extractability, etc.; effect of hydrogen treatment as related to the foregoing and to hydrogen pressure and temperature; and the effect of catalysts in conjunction with the optimum conditions previously found, to obtain the maximum yield of the desired product.

In connection with the study of the characteristics of coals for underfeed stokers, which is being made at Battelle Memorial Institute, Columbus, Ohio, three residential types of stokers have been chosen for the initial tests. The characteristic feature of one is that the worm moves continuously when the stoker is operating. In another, the worm is moved intermittently by a ratchet-and-pawl device. The basis of selection of the third stoker was the number of retorts and tuyeres available and their ease of change.

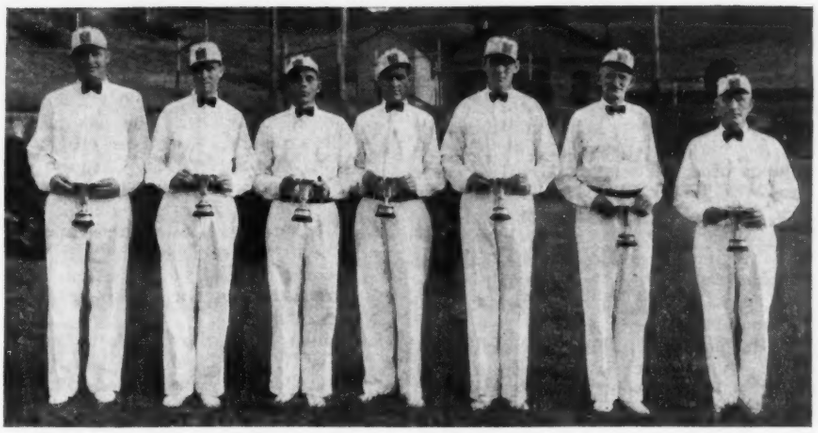
Special furnaces have been designed and built for these tests and the entire stoker and furnace assembly will be mounted on scales so that the rate of burning may be known at any time. Hand-fired domestic furnaces are being studied pending the advent of the heating season, when the principal work in connection with a survey of domestic heating will be undertaken.

Study of the chemical treatment of coals, also at Battelle Institute, is being directed chiefly toward determining the relation of the type of coal and its size to the quantity of oil or chemical required for permanent dustproofing; the effect of oil or chemical treatment on weathering, on feeding from hoppers, and on fuel-bed characteristics. Tests also are being made on the effect of oil treatment of mine-run on its washability.

Central West Virginia Meet Brings 54 Safety Teams

With 54 mining, industrial and junior teams competing, the Central West Virginia Coal Mining Institute held its fourth annual safety day and first-aid contest at Jacksons Mill, W. Va., August 10, under the sponsorship of the West Virginia Department of Mines. First place in the first-aid contest went to the Owings No. 32 mine team of the Consolidation Coal Co., which nosed out the Rosemont mine team of the Reppert Coal Co. by the margin of a minus mark in a run-off to break a tie. Both teams won the right to participate in the State meet at Beckley, W. Va., Sept. 28, as did the Grant Town colored team of the Koppers Coal & Transportation Co., winners in that division and state champions among colored teams in 1934.

Other white teams in the first ten, to all of which prizes were awarded, were, in order: Mine No. 40, Davis Coal & Coke Co.; Galloway mine, Simpson Creek Collieries Co.; Carolina mine, Consolidation Coal Co.; Mine No. 1, Pardee & Curtin Lumber Co.; Glen Cambria mine, Mountain Fuel Co.; Laura Lee mine, Hutchinson Coal Co.; Scott mine, Bethlehem-Fairmont Coal Co.; Grant Town mine, Koppers Coal & Transportation Co. Carolina mine colored team of the Consolidation Coal Co. took second place in this division, completing the list of teams in the prize classification. Prizes in the Junior division went to the following Consolidation Coal Co. teams, in order: Owings No. 32 boys; Monongah No. 63 girls; Clarksburg No. 25 girls; and Clarksburg No. 25 boys.



Owings No. 32 First-Aid Team, Which Took First Place in the Central West Virginia Meet

Meet officials were as follows: director, L. S. McGee, district mine inspector, Shinnston, assisted by the following executive committee: J. H. Nuzum, general superintendent, Fairmont division, Hutchinson Coal Co., and president of the institute; P. J. McGraw, Farmington, and W. H. Sandridge, Grafton, district mine inspectors; W. J. Wolf, manager, West Virginia division, Consolidation Coal Co.; M. W. Horgan, Monongahela West Penn Public Service Co.; Carl Hornor, mining engineer, and Robert Kann, Clarksburg; chief judge, J. J. Forbes, supervising engineer, Pittsburgh Station, U. S. Bureau of Mines; chief supervising judge, George W. Groves, Pittsburgh Station; assistant chief judge, P. D. McMurrer, safety director, West Virginia Department of Mines; and chief recorder, C. O. Morris, district mine inspector.

Guffey-Snyder Coal Bill Squeaks Through In Closing Sessions of Congress

WASHINGTON, D. C., Aug. 26—With few votes to spare, the revised Guffey-Snyder coal-control bill was passed by Congress last week and sent to the White House for Presidential approval late Friday night. When the first roll call on the final vote on the measure as amended by the Committee on Ways and Means and from the floor of the House was taken on Aug. 19, opponents of the bill mustered 137 votes, while only 131 members recorded favorable votes, but, after missing members had been rounded up, the final roll call showed that the bill had passed by 195 to 168. The opposition corraled 93 votes from Democratic members of the House and 73 Republicans and 2 Progressive-Farm Laborites joined the negative side. Fifteen Republicans and 7 Progressives and Farm-Labor members voted with 173 Democratic Congressmen in favor of the bill.

Three days later the Senate passed the bill as further amended by the upper house by a vote of 45 to 37. Twenty-four Democrats, 12 Republicans and 1 Farmer-Laborite supplied the opposition; 38 Democrats, 6 Republicans and 1 Progressive voted in favor of the measure. When the bill as amended by the Senate was returned to the House that evening for concurrence, the House declined to accept the Senate changes and named Representatives Hill, of Washington; Vinson, of Kentucky; Knutson, of Minnesota, and Reed, of New York, as conferees to meet with Senators Neely, of West Virginia; Barkley, of Kentucky, and Davis, of Pennsylvania, to iron out the differences between the two houses. Concessions were made by both groups at their meeting on Aug. 23 and the report of the conferees on the compromise agreement reached was presented the same day. The House approved the conference report by a vote of 186 to 150 and the Senate accepted it without a record vote.

As forecast last month (*Coal Age*, August, 1935, p. 353), the House subcommittee under the chairmanship of Samuel B. Hill eliminated Title II, providing for the creation of a National Bituminous Coal Reserve and the employment of federal government credit to buy up marginal mines and undeveloped coal lands, before reporting the bill to the full Committee on Ways and Means. The excise tax on coal was cut from 25 to 15 per cent of the sale price at the mine and the drawback to producers subscribing to the code set up by the bill was reduced from 99 to 90 per cent. Provision for operator and miner representation on the National Bituminous Coal Commission was stricken out and the number of Commissioners reduced from nine to five with salaries of Commissioners and also of members of the Bituminous Coal Labor Board cut from $12,000 to $10,000 per annum.

The proposal to deny access to the mails to producers who refused to subscribe to Title I of the bill also went by the boards. A like fate overtook the section which sought to prohibit the Interstate Commerce Commission from authorizing the extension of railroad facilities to any mine producing bituminous coal except upon approval of the Coal Commission. The committee also

added a provision (Sec. 12) outlawing all contracts entered into subsequent to Oct. 2, 1933, and prior to the date of approval of the Bituminous Coal Conservation Act of 1935—the official name for the Guffey-Snyder measure—at less than minimum code prices. Marketing agencies "for the disposal of competitive coals in interstate commerce at prices to be determined by such agency or by the agreement of producers operating through such agency" were specifically declared to be unlawful combinations in restraint of trade unless such agencies were approved by the Coal Commission.

In its final form, the bill as passed declares bituminous coal to be affected with a national public interest. A National Bituminous Coal Commission, none of whose members shall be financially interested in the mining, transportation or sale of coal or oil, gas or hydro-electric power or in the manufacture of related equipment, is created to regulate the marketing side of the industry. A Bituminous Coal Labor Board of three members, one of whom shall represent the public, one the operators and the third the miners, is set up to handle labor problems and to guarantee to labor the right and privileges accorded to it under Sec. 7(a) of the old NIRA. This board, however, is without authority to intervene or to settle disputes involving wages and working conditions except where it is asked to act as arbitrator by both parties of interest.

Twenty-Three Districts Set Up

For control purposes the bituminous fields are grouped into 23 districts and these in turn are combined into 9 minimum-price areas. The largest of these areas embraces Pennsylvania, Ohio, Maryland, West Virginia, Virginia, Kentucky, part of Tennessee, three counties in North Carolina, Illinois, Indiana, Michigan and Iowa. Twenty-three district boards are to be set up. Each district board shall consist of not less than three nor more than seventeen members. One member shall be selected "by the organization of employees representing the preponderant number of employees in the industry of the district in question." One-half the remaining membership is to be elected by the majority in number of producers represented at the organization meeting called for that purpose and the other half on a tonnage basis.

District boards are directed to establish minimum prices for their respective districts and transmit these prices to the Commission for approval and/or modification. In order to maintain stability in wages and working conditions, "said prices shall be established so as to yield a return per net ton for each district in a minimum-price area equal as nearly as may be to the weighted average of the total costs per net ton of the tonnage of such minimum-price area." These boards also are directed to submit weighted average cost figures to the Commission, and from these the Commission is to work out weighted average costs to be used as the basis for the establishment of minimum prices "to be effective until changed by the Commission."

In addition to "full authority" to make such classifications and price variations "as to mines and consuming market areas as" the board "may deem necessary and proper," district boards must also coordinate prices in common consuming market areas to the end that all minimum prices shall be just and not unduly prejudicial or preferential and "shall reflect, as nearly as possible, the relative market values, at points of delivery in each common consuming market area, of the various kinds, qualities and sizes of coal produced in the various districts." The purpose of this provision, it is stated, is to afford "the producers in the several districts substantially the same opportunity to dispose of their coals upon a competitive basis as has heretofore existed." These correlated prices also are subject to approval or modification by the Commission. Maximum prices may be established when such action is deemed in the public interest.

Trade practices condemned in Secs. 6 to 15 inclusive and in Secs. 17 and 18 of Art. VI of the NRA bituminous-coal code (*Coal Age*, October, 1933, pp. 327, 351) are specifically outlawed as unfair methods of competition in the code incorporated in the new law. The old code prohibition against selling to a broker or agency which is in effect a creature of a retailer or industrial consumer or groups of such buyers whereby such groups directly or indirectly may secure rebates, dividends, allowances or other concessions, however, has been modified by a Senate amendment in the new law which lifts legitimate farmers' cooperative organizations out of the proscribed group.

Consumers' Counsel Created

A third agency, not contemplated in the earlier drafts of the bill, also has been created. As the act now reads, the office of Consumers' Counsel of the Commission is established in the Department of the Interior. The counsel, who will receive the same salary as a Commissioner, is authorized to appear "in the interest of the consuming public" in any hearing before the Commission and to conduct such independent investigations as he may deem necessary "to enable him to properly represent the consuming public" in any Commission proceeding. He may also call upon the Commission for any information which he thinks is in the interest of the public and ask the Commission to "conduct any investigation as to any matter within its authority."

What appeared at one time a hopeless deadlock within the House committee over the question of the constitutionality of the bill was finally broken on Aug. 12 when the Committee on Ways and Means by a 12 to 11 vote, with two members not voting, decided to report out the measure with a favorable recommendation. Six of the seven Republican members of the committee were against the bill, but Representative Thomas A. Jenkins, of Ohio, voted for the measure. Jere Cooper, Democratic Representative from Tennessee, presented a separate minority report against the bill which was indorsed by his party colleagues, Representatives Morgan G. Sanders, Texas; Claude A. Fuller, Arkansas; Arthur P. Lamneck, Ohio; and Chester Thompson, Illinois. Democratic committee members, Frank H. Buck, California; Wesley E. Disney, Oklahoma; and John W. McCormack, Massachusetts, although not joining in the minority report, also voted againt the measure on the final roll call Aug. 19.

Constitutionality Dominates Debate

Questions of constitutionality and increased costs to the consumer dominated the debate when the House resolved itself into the committee of the whole to consider the measure on Aug. 16. Subcommittee Chairman Hill and Representative Fred. M. Vinson, Kentucky, assumed the burden of defending the constitutionality of the measure and both made a point of President Taft's veto of the Webb-Pomerene act on the grounds of alleged unconstitutionality, pointing out that the bill had been passed over his veto and subsequently was upheld as constitutional by the Supreme Court. Intimations were made on the floor that advocates of the potato amendment to the Agricultural Adjustment Act had traded votes with the pro-Guffeyites—and there were no heated denials of the charge.

Representative Allen T. Treadway, of Massachusetts, ranking minority member of the committee, was generalissimo of the attacking forces. He made a great point of his oath to support the Constitution and assailed the President for his letter to the committee urging favorable action on the bill regardless of doubts as to constitutionality. Against the protesting denials of the Guffeyites, he insisted that the bill would mean an increase of $1 to $1.50 per ton in the price of coal. Toward the end of the day, one of the Guffeyites exhumed the bill for federal control of coal introduced by the Massachusetts Congressman during the Coolidge administration and the next day Representative Vinson wanted to know how the gentleman from Massachusetts reconciled his sponsorship of that bill with his present position. Mr. Treadway led the applause which burst forth when the Kentuckian finished his speech.

Except for a few minor changes in district boundaries, which were accepted without opposition from the floor managers for the bill, proponents of the measure were able to defeat all amendments which they considered dangerous except one changing the basis of producer representation on the district boards. This amendment, which divided producer membership equally between representatives elected by a majority vote of the district operators and by a tonnage vote, was accepted on a demand for tellers by a vote of 66 to 27. An amendment prohibiting the employment by the Commission of any person related to a Commissioner by marriage or in third degree by blood was accepted by a vote of 67 to 26.

TO RESUME WAGE PARLEY

THE JOINT WAGE CONFERENCE for the Appalachian region will meet in Washington Sept. 5 and resume its efforts to reach a new agreement. The conferees voted unanimously July 26 to accede to a request by President Roosevelt that the existing wage contract be extended until Sept. 16 because of "substantial prospects" of constructive legislation. It was the fourth time the agreement was extended since conferences began, on Feb. 18.

John L. Lewis, president, United Mine Workers, said the union was acting in the utmost good faith in acceding to the request of the President, but declared that this extension "should be the last."

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Floor managers on the Senate side, however, were less successful in keeping out unwanted amendments. An amendment offered by Senator Borah of Idaho, striking out the first sentence of Sec. 4, which read:

> While this Act is in effect and for sixty days thereafter, the provisions of the anti-trust laws of the United States shall not apply to any producer of bituminous coal who has accepted and obligated himself to comply, and who complies with the provisions of this section, or to any marketing agency or board created under and operating in compliance with this section

was agreed to by Senator Neely without objection. Proposals on the part of Senator Tydings, of Maryland, to eliminate or reduce the excise tax, however, were defeated. Senator Minton, Indiana, forced through an amendment removing Illinois, Indiana and Iowa from minimum-price area No. 1, but that amendment died in the compromise agreement between the conferees of the two houses. A like fate met amendments to govern the political affiliations of the membership of the Commission and the Labor Board to assure minority representation in the complexion of those agencies.

Senate amendments designed to put the staffs of these agencies under civil service regulations, however, were accepted by the House. Senator Neely announced that the amendment governing the qualifications of the labor member of the district boards which changed the House language from selection by "the national organization of employees representing the preponderant number of employees in the industry" to selection by "the organization of employees representing the preponderant number of employees in the industry of the district in question" was distasteful to the sponsors of the bill, but would be accepted "to avoid the delay of debate and the danger of final adjournment before this bill is passed."

The text of the Bituminous Coal Conservation Act of 1935 follows:

An Act to stabilize the bituminous coal-mining industry and promote its interstate commerce; to provide for cooperative marketing of bituminous coal; to levy a tax on bituminous coal and provide for a drawback under certain conditions; to declare the production, distribution, and use of bituminous coal to be affected with a national public interest; to conserve the bituminous coal resources of the United States; to provide for the general welfare, and for other purposes; and providing penalties.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is hereby recognized and declared that the mining of bituminous coal and its distribution by the producers thereof in and throughout the United States are affected with a national public interest; that the service of bituminous coal in relation to the industrial activities, the transportation facilities, the health and comfort of the people of the United States; the conservation of bituminous coal deposits in the United States by controlled production and economical mining and marketing; the maintenance of just and rational relations between the public, owners, producers, and employees; the right of the public to constant and ample supplies of coal at reasonable prices; and the general welfare of the Nation require that the bituminous coal industry be regulated as herein provided.

It is further recognized and declared that all production of bituminous coal and distribution by the producers thereof bear upon and directly affect its interstate commerce and render regulation of all such production and distribution imperative for the protection of such commerce and the national public service of bituminous coal and the normal governmental revenues derivable from such industry; that the excessive facilities for the production of bituminous coal and the overexpansion of the industry have led to practices and methods of production, distribution, and marketing of such coal that waste such coal resources of the Nation, disorganize the interstate commerce in such coal and portend the destruction of the industry itself, and burden and obstruct the interstate commerce in such coal, to the end that control of such production and regulation of the prices realized by the producers thereof are necessary to promote its interstate commerce, remove burdens and obstructions therefrom, and protect the national public interest therein; that practices prevailing in the production of bituminous coal directly affect its interstate commerce and require regulation for the protection of that commerce, and that the right of mine workers to organize and collectively bargain for wages, hours of labor, and conditions of employment should be guaranteed in order to prevent constant wage cutting and the establishment of disparate labor costs detrimental to fair competition in the interstate marketing of bituminous coal, and in order to avoid those obstructions to its interstate commerce that recur in the industrial disputes over labor relations at the mines.

NATIONAL BITUMINOUS COAL COMMISSION

Sec. 2. (a) There is hereby established in the Department of the Interior a National Bituminous Coal Commission (herein referred to as "Commission"), which shall be composed of five members appointed by the President, by and with the advice and consent of the Senate, for a term of four years or until the prior termination of this title. The Commission shall annually designate its chairman, and shall have a seal which shall be judicially recognized. Any person appointed to fill a vacancy shall be appointed only for the unexpired term of his predecessor in office. The Commission shall have an office in the city of Washington, District of Columbia, and shall convene at such times and places as the majority of the Commission shall determine. The members of the Commission shall have no financial interest, direct or indirect, in the mining, transportation, or sale of, or manufacture of equipment for, coal, oil, or gas or in the generation, transmission or sale of hydro-electric power, or in the manufacture of equipment for the use thereof, and shall not engage in any other business, vocation, or employment. Any Commissioner may be removed by the President for inefficiency, neglect of duty, or malfeasance in office. The Commission shall, with due regard to the provisions of the civil-service laws or the Classification Act of 1923, as amended, appoint and fix the compensation and duties of a secretary and necessary clerical and other assistants, none of whom shall be related to any member of the Commission by marriage or within the third degree by blood. The members of the Commission shall each receive compensation at the rate of $10,000 per year and necessary traveling expenses. Such Commission shall have the power to make and promulgate all reasonable rules and regulations for carrying out the provisions of this Act, and shall annually make full report of its activities to the Secretary of the Interior for transmission to Congress. Upon all matters within its jurisdiction coming before it for determination, it shall have the power and duty of hearing evidence and finding facts upon which its orders and action may be predicated, and its findings of fact supported by any substantial evidence shall be conclusive upon review thereof by any court of the United States.

(b) (1) There shall be an office in the Department of the Interior to be known as the office of the Consumers' Counsel of the National Bituminous Coal Commission. The office shall be in charge of a counsel to be appointed by the President, by and with the advice and consent of the Senate. The counsel shall have no financial interest, direct or indirect, in the mining, transportation, or sale of, or the manufacture of equipment for, coal, oil, or gas, or in the generation, transmission, or sale of hydro-electric power, or in the manufacture of equipment for the use thereof, and shall not engage in any other business, vocation, or employment. The counsel shall receive compensation at the rate of $10,000 per year and necessary traveling expenses.

(2) It shall be the duty of the counsel to appear in the interest of the consuming public in any proceeding before the Commission and to conduct such independent investigation of matters relative to the bituminous coal industry and the administration of this Act as he may deem necessary to enable him properly to represent the consuming public in any proceeding before the Commission. In any proceeding before the Commission in which the counsel has entered an appearance, the counsel shall have the right to offer any relevant testimony and argument, oral or written, and to examine and cross-examine witnesses and parties to the proceeding, and shall have the right to have subpena or other process of the Commission issue in his behalf. Whenever the counsel finds that it is in the interest of the consuming public to have the Commission furnish any information at its command or conduct any investigation as to any matter within its authority, then the counsel shall so certify to the Commission, specifying in the certificate the information or investigation desired. Thereupon the Commission shall promptly furnish to the counsel the information or promptly conduct the investigation and place the results thereof at the disposal of the counsel.

(3) Within the limitations of such appropriations as the Congress may from time to time provide, the counsel is authorized, with due regard to the civil service laws and the Classification Act of 1923, as amended, to appoint and fix the compensation and duties of such assistants and clerks, and is authorized to make such expenditures, as may be necessary for the performance of the duties vested in him.

TAX ON BITUMINOUS COAL

Sec. 3. There is hereby imposed upon the sale or other disposal of all bituminous coal produced within the United States an excise tax of 15 per centum on the sale price at the mine, or in the case of captive coal the fair market value of such coal at the mine, such tax, subject to the later provisions of this section, to be payable to the United States by the producers of such

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FHA RULES ON MINING LOANS

DEFINITE ruling on particular types of equipment upon which banks may make modernization loans insurable by the Federal Housing Administration under the amended National Housing Act (*Coal Age*, August, 1935, p. 351) was made early last month by J. C. Foote, legal adviser to the FHA Eligibility Board, in response to a request for such ruling by Marc G. Bluth, executive secretary, Committee of Ten—Coal and Heating Industries, and one of the industrial advisers to FHA. The types of equipment which have been held to be definitely eligible if installed in eligible buildings in conformity with FHA regulations are:

Aerial tramways, boom loaders, breaker or crushing machines, coal washers, control panelboards, conveyor belts and rollers, electric controls, electric motors, gears, hoists, lamp racks, mine cages and elevators and structural steel, mine-track equipment, motor-generator sets, preparation and washing machinery, pumps, steam pumps, tipples and coal-preparation plants, tramway tracks, trestles and conveyor housing, ventilation fans, ventilation fan guards and housing, and vibrating-shaker preparation screens when built in.

No specific ruling has as yet been made as to the eligibility of equipment such as cutting machines, portable air compressors, electric mine locomotives, ventilation tubes and blowers, drills, loading machines, conveyors for underground use and rock-dusting machines. Decision on the eligibility of these and other types of equipment, however, probably will be made at an early date. In every case, of course, FHA insurance on loans is limited to additions to and improvements in property which already is in operation.

coal, and to be payable monthly for each calendar month, on or before the first business day of the second succeeding month, and under such regulations, and in such manner, as shall be prescribed by the Commissioner of Internal Revenue: *Provided*, That in the case of captive coal produced as aforesaid, the Commissioner of Internal Revenue shall fix a price therefor at the current market price for the comparable kind, quality, and size of coals in the locality where the same is produced: *Provided further*, That any such coal producer who has filed with the National Bituminous Coal Commission his acceptance of the code provided for in Sec. 4 of this Act, and who acts in compliance with the provisions of such code, shall be entitled to a drawback in the form of a credit upon the amount of such tax payable hereunder, equivalent to 90 per centum of the amount of such tax, to be allowed and deducted therefrom at the time settlement therefor is required, in such manner as shall be prescribed by the Commissioner of Internal Revenue. Such right or benefit of drawback shall apply to all coal sold or disposed of from and after the day of the producer's filing with the Commission his acceptance of said code in such form of agreement as the Commission may prescribe. No producer shall by reason of his acceptance of the code provided for in Sec. 4 or of the drawback of taxes provided in Sec. 3 of this Act be held to be precluded or estopped from contesting the constitutionality of any provision of said code, or its validity as applicable to such producer.

Bituminous Coal Code

Sec. 4. The provisions of this section shall be formulated by the Commission into a working agreement, to be known as the "Bituminous Coal Code," and herein referred to as the "Code." Producers accepting and operating under its provisions are herein referred to as "Code members."

For the purpose of carrying out the declared policy of this Act, the code shall contain the following conditions, provisions, and obligations which will tend to regulate interstate commerce in bituminous coal and transactions directly affecting interstate commerce in bituminous coal:

Part I—Organization and Production

(a) Twenty-three district boards of coal producers shall be organized. Each district board shall consist of not less than three nor more than seventeen members. The number of members of the district board shall, subject to the approval of the Commission, be determined by the majority vote of the district tonnage during the calendar year 1934 represented at a meeting of the producers of the district called for the purpose of such determination and for the election of such district board; and all known producers within the district shall be given notice of the time and place of the meeting. All but one of the members of the district board shall be producers or representatives of producers truly representative of all the mines of the district. The number of such producer members shall be an even number. One-half of such producer members shall be elected by the majority in number of the producers of the district represented at the aforesaid meeting. The other producer members shall be elected by votes cast in the proportion of the annual tonnage output for the preceding calendar year of the producers in the district, with the right on the part of the producers to vote their tonnage cumulatively: *Provided*, That not more than one officer or employee of any producer within a district shall be a member of the district board at the same time. The remaining member of each district board shall be selected by the organization of employees representing the preponderant number of employees in the industry of the district in question. The term of district board members shall be two years and until their successors are elected.

In case any marketing agency comprising a substantial number of code members in any producing field within a district establishes, to the satisfaction of the Commission, that it has no representation upon the district board and that it is fairly entitled thereto, the Commission may, in its discretion, after hearing, increase the membership of such district board so as to provide for such representation.

Marketing agencies may be established or maintained within any district by a voluntary association of producers within any producing field therein, as such producing field may be defined by the district board, and function under such general rules and regulations as may be prescribed by the district board, with the approval of the Commission, for the purpose of marketing their coal with due respect for the standards of unfair competition as defined in this Act. Each such marketing agency shall impose no unreasonable or inequitable conditions of membership and shall be truly representative of at least one-third of the tonnage of any producing field or group of producing fields.

The term "marketing agency" or "agencies" as used in this Act shall include any trade association of coal producers complying with the requirements of a marketing agency and exercising the functions thereof.

The district boards and marketing agencies shall each have power to adopt bylaws and rules of procedure, subject to approval of the Commission, and to appoint officers from their own membership, to fix their terms and compensation, to provide for reports, and to employ such committees, employees, arbitrators, and other persons necessary to effectuate their purposes. Members of the district board shall serve, as such, without compensation, but may be reimbursed for their reasonable expenses. The territorial boundaries or limits of such twenty-three districts are set forth in the schedule entitled "Schedule of Districts" and annexed to this Act: *Provided*, That the territorial boundaries or limits of any district or districts may be changed, or said districts may be divided or consolidated, after hearing, by the Commission.

(b) The expense of administering the code by the respective district boards shall be borne by those subject to the jurisdiction of such boards, respectively, each paying his proportionate share, as assessed, computed on a tonnage basis, in accordance with regulations prescribed by such boards with the approval of the Commission. Such assessments may be collected by the district board by action in any court of competent jurisdiction.

(c) Nothing contained in this Act shall constitute the members of a district board partners for any purpose. Nor shall any member of a district board be liable in any manner to any one for any act of any other member, officer, agent or employee of the district board. Nor shall any member of a district board, exercising reasonable diligence in the conduct of his duties under this Act, be liable to any one for any action or omission to act under this Act, except for his own willful misfeasance, or for nonfeasance involving moral turpitude.

Part II—Marketing

The district boards and code members shall accept and be subject to the jurisdiction of the Commission to approve or to fix minimum and maximum prices, as follows:

(a) All code members shall, in their respective districts, report all spot orders to the district board and shall file with it copies of all contracts for the sale of coal, copies of all invoices, copies of all credit memoranda, and such other information concerning the preparation, cost, sale, and distribution of coal as the Commission may authorize or require. All such records shall be held by the district board as the confidential records of the code member filing such information.

Each district board may set up and maintain a statistical bureau, and the district board may require that such reports and other information in this subsection described shall be filed with such statistical bureau in lieu of the filing thereof with the district board.

Each district board shall, from time to time on its own motion or when directed by the Commission, establish minimum prices free on board transportation facilities at the mines for kinds, qualities, and sizes of coal produced in said district, with full authority, in establishing such minimum prices, to make such classification of coals and price variations as to mines and consuming market areas as it may deem necessary and proper. In order to sustain the stabilization of wages, working conditions, and maximum hours of labor, said prices shall be established so as to yield a return per net ton for each district in a minimum price area, as such districts are identified and such area is defined in the subjoined table designated "Minimum-price area table," equal as nearly as may be to the weighted average of the total costs, per net ton, determined as hereinafter provided, of the tonnage of such minimum price area. The computation of the total costs shall include the cost of labor, supplies, power, taxes, insurance, workmen's compensation, royalties, depreciation, and depletion (as determined by the Bureau of Internal Revenue in the computation of the Federal income tax) and all other direct expenses of production, coal operators' association dues, district board assessments for board operating expenses only, levied under the code, and reasonable costs of selling and the cost of administration.

Minimum-Price-Area Table

Area 1: Eastern Pennsylvania, district 1; western Pennsylvania, district 2; northern West Virginia, district 3; Ohio, district 4; Michigan, district 5; Panhandle, district 6; Southern numbered 1, district 7; Southern numbered 2, district 8; West Kentucky, district 9; Illinois, district 10; Indiana, district 11; Iowa, district 12; that part of Southeastern, district 13, comprising Van Buren, Warren, and McMinn Counties in Tennessee.

Area 2: Southeastern, district 13, except Van Buren, Warren, and McMinn Counties in Tennessee.

Area 3: Arkansas-Oklahoma, district 14.

Area 4: Southwestern, district 15.

Area 5: Northern Colorado, district 16; southern Colorado, district 17; New Mexico, district 18.

Area 6: Wyoming, district 19; Utah, district 20.

Area 7: North Dakota and South Dakota, district 21.

Area 8: Montana, district 22.

Area 9: Washington, district 23.

The minimum prices so established shall reflect, as nearly as possible, the relative market value of the various kinds, qualities, and sizes of coal, shall be just and equitable as between producers within the district, and shall have due regard to the interests of the consuming public. The procedure for establishment of minimum prices shall be in accordance with rules and regulations to be approved by the Commission.

A schedule of such minimum prices, together with the data upon which they are computed, including, but without limitation, the factors considered in determining the price relationship, shall be submitted by the district board to the Commission, which may approve, disapprove, or modify the same to conform to the requirements of this subsection, and such approval, disapproval, or modification shall be binding upon all code members within the district, subject to such modification therein as may result from the coordination provided for in the succeeding subsection (b): *Provided*, That all minimum prices established for any kind, quality, or size of coal for shipment into any consuming market area shall be just and equitable as between producers within the district: *And provided further*, That no minimum price shall be established that permits dumping.

As soon as possible after its creation, each district board shall determine the weighted average of the total costs of the ascertainable tonnage produced in the district in the calendar year 1934. The district board shall adjust the average costs so determined, as may be necessary to give effect to any changes in wage rates, hours of employment, or other factors substantially affecting costs, exclusive of seasonal changes, so as to reflect as accurately as possible any change or changes which may have been established since Jan. 1, 1934. Such determination and the computations upon which it is based shall be promptly submitted to the Commission by each district board in the respective minimum-price area. The Commission shall

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ANTI-CHISELING BILL DROPPED

Senator Walsh's bill to impose NRA wage and hour provisions on contractors supplying the government with goods or services (July *Coal Age*, p. 305) was shelved by the House Judiciary Committee on Aug. 20. The committee voted, 13 to 7, against reporting it to the House, although the measure was on the "must" program reported approved at a White House conference of Congressional leaders with President Roosevelt on Aug. 18. The bill was passed by the Senate Aug. 12. Business representatives opposed the measure as "tyrannical." The bill would have applied to all contracts financed, even in part, by federal loans, grants or appropriations, whether made by governmental units or private parties using government funds.

thereupon determine the weighted average of the total costs of the tonnage for each minimum-price area in the calendar year 1934, adjusted as aforesaid, and transmit it to all the district boards within such minimum-price area. Said weighted average of the total costs shall be taken as the basis for the establishment of minimum prices to be effective until changed by the Commission. Thereafter, upon satisfactory proof made at any time by any district board of a change in excess of 2c. per net ton of 2,000 lb. in the weighted average of the total costs in the minimum-price area, exclusive of seasonal changes, the Commission shall increase or decrease the minimum prices accordingly. The weighted average figures of total cost determined as aforesaid shall be available to the public.

Each district board shall, on its own motion or when directed by the Commission, establish reasonable rules and regulations incidental to the sale and distribution of coal by code members within the district. Such rules and regulations shall not be inconsistent with the requirements of this section and shall conform to the standards of fair competition hereinafter established. Such rules and regulations shall be submitted by the district board to the Commission with a statement of the reasons therefor, and the Commission may approve, disapprove, or modify the same, and such approval, disapproval, or modification shall be binding upon all code members within the district.

(b) District boards shall, under rules and regulations established by the Commission, coordinate in common consuming market areas upon a fair competitive basis the minimum prices and the rules and regulations established by them, respectively, under subsection (a) hereof. Such coordination, among other factors, but without limitation, shall take into account the various kinds, qualities, and sizes of coal, and transportation charges upon coal. All minimum prices established for any kind, quality, or size of coal for shipment into any consuming market area shall be just and equitable, and not unduly prejudicial or preferential, as between and among districts, and shall reflect, as nearly as possible, the relative market values, at points of delivery in each common consuming market area, of the various kinds, qualities and sizes of coal produced in the various districts; to the end of affording the producers in the several districts substantially the same opportunity to dispose of their coals upon a competitive basis as has heretofore existed. The minimum prices established as a result of such coordination shall not, as to any district, reduce or increase the return per net ton upon all the coal produced therein below or above the minimum return as provided in subsection (a) of this section by an amount greater than necessary to accomplish such coordination, to the end that the return per net ton upon the entire tonnage of the minimum price area shall approximate and be not less than the weighted average of the total costs per net ton of the tonnage of such minimum price area. Such coordinated prices and rules and regulations, together with the data upon which they are predicated, shall be submitted to the Commission, which may approve, disapprove, or modify the same to establish and maintain such fair competitive relationship, and such approval, disapproval, or modification shall be binding upon all code members within the affected districts. No minimum price shall be established that permits dumping. On the petition of any district board or other party in interest or on its own motion, after notice to the district boards, the Commission may at any time conduct hearings to determine whether the foregoing method of fixing minimum prices under subsection (a) is prejudicial to any district with respect to the fair opportunity of such district to market its coal. Should the Commission so find, and further find that the prejudice cannot be removed through the coordination of minimum prices as provided for in this subsection (b), then the Commission may establish a different basis for determining minimum prices in such district, to the end that fair and competitive prices shall prevail in the marketing of the coal produced in such district: *Provided*, That the minimum prices so established as to any such district shall yield a return, per net ton, not less than the weighted average of the total costs, per net ton, of the tonnage of such district.

(c) When, in the public interest, the Commission deems it necessary to establish maximum prices for coal in order to protect the consumer of coal against unreasonably high prices therefor, the Commission shall have the right to fix maximum prices free on board transportation facilities for coal in any district. Such maximum prices shall be established at a uniform increase above the minimum prices in effect within the district at the time, so that in the aggregate the maximum prices shall yield a reasonable return above the weighted average total cost of the district: *Provided*, That no maximum price shall be established for any mine which shall not return cost plus a reasonable profit.

(d) If any code member or district board, or any State or political subdivision of a State shall be dissatisfied with such coordination of prices or rules and regulations, or by a failure to establish such coordination of prices or rules and regulations, or by the maximum prices established for him or it pursuant to subsection (c) of this section, he or it shall have the right, by petition, to make complaint to the Commission, and the Commission shall, under rules and regulations established by it, and after notice and hearing, make such order as may be required to effectuate the purpose of subsections (b) and (c) of this section, which order shall be binding upon all parties in interest. Pending final disposition of such petition, and upon reasonable showing of necessity therefor, the Commission may make such preliminary or temporary order as in its judgment may be appropriate, and not inconsistent with the provisions of this Act.

(e) Subject to the exceptions provided in Sec. 12 of this Act, no coal shall be sold or delivered at a price below the minimum or above the maximum therefor approved or established by the Commission, and the sale or delivery of coal at a price below such minimum or above such maximum shall constitute a violation of the code.

Subject to the exceptions provided in Sec. 12 of this Act, a contract for the sale of coal at a price below the minimum or above the maximum therefor approved or established by the Commission at the time of the making of the contract shall constitute a violation of the code, and such contract shall be invalid and unenforceable.

From and after the date of approval of this Act, until prices shall have been established pursuant to subsections (a) and (b) of Part II of this section, no contract for the sale of coal shall be made providing for delivery for a period longer than 30 days from the date of the contract.

While this Act is in effect no code member shall make any contract for the sale of coal for delivery after the expiration date of this Act at a price below the minimum or above the maximum therefor approved or established by the Commission and in effect at the time of making the contract.

The minimum prices established in accordance with the provisions of this section shall not apply to coal sold by a code member and shipped outside the domestic market. The domestic market shall include all points within the continental United States and Canada, and car-ferry shipments to the Island of Cuba. Bunker coal delivered to steamships for consumption thereon shall be regarded as shipped within the domestic market. Maximum prices established in accordance with the provisions of this section shall not apply to coal sold by a code member and shipped outside the continental United States.

(f) All data, reports, and other information in the possession of the National Recovery Administration in relation to bituminous coal shall be available to the Commission for the administration of this Act.

(g) The price provisions of this Act shall not be evaded or violated by or through the use of docks or other storage facilities or transportation facilities, or by or through the use of subsidiaries, affiliated sales or transportation companies or other intermediaries or instrumentalities, or by or through the absorption, directly or indirectly, of any transportation or incidental charge of whatsoever kind or character, or any part thereof. The Commission is hereby authorized, after investigation and hearing, and upon notice to the interested parties, to make and issue rules and regulations to make this subsection effective.

(h) All sales and contracts for the sale of coal shall be subject to the code prices herein provided for and in effect at the time of the making of such sales and contracts. The Commission shall prescribe the price allowance to and receivable by persons who purchase coal for resale, and resell it in not less than cargo or railroad carload lots; and shall require the maintenance by such persons, in the resale of coal, of the minimum prices established under this Act.

UNFAIR METHODS OF COMPETITION

(i) The following practices shall be unfair methods of competition and shall constitute violations of the code:

1. The consignment of unordered coal, or the forwarding of coal which has not actually been sold, consigned to the producer or his agent: *Provided, however*, That coal which has not actually been sold may be forwarded, consigned to the producer or his agent at rail or track yards, tidewater ports, river ports, or lake ports, or docks beyond such ports. Such limitations on the consignment of coal shall not apply to the following classes: Bunker coal, coal applicable against existing contracts, coal for storage (other than in railroad cars) by the producer or his agent in rail or track yards or on docks, wharves, or other yards for resale by the producer or his agent.

2. The adjustment of claims with purchasers of coal in such manner as to grant secret allowances, secret rebates, or secret concessions, or other price discrimination.

3. The prepayment of freight charges with intent to or having the effect of granting a discriminatory credit allowance.

4. The granting in any form of adjustments, allowances, discounts, credits, or refunds to purchasers or sellers of coal, for the purposes or with the effect of altering retroactively a price previously agreed upon, in such manner as to create price discrimination.

5. The predating or postdating of any invoice or contract for the purchase or sale of coal, except to conform to a bona fide agreement for the purchase or sale entered into on the predate.

6. The payment or allowance in any form or by any device of rebates, refunds, credits, or unearned discounts, or the extension to certain purchasers of services or privileges not extended to all purchasers under like terms and conditions, or under similar circumstances.

7. The attempt to purchase business, or to obtain information concerning a competitor's business by concession, gifts, or bribes.

8. The intentional misrepresentation of any analysis or of analyses, or of sizes, or the intentional making, causing, or permitting to be made, or publishing, of any false, untrue, misleading, or deceptive statement by way of advertising, invoicing, or otherwise concerning the size, quality, character, nature, preparation, or origin of any coal bought, sold, or consigned.

9. The unauthorized use, whether in written or oral form, of trade marks, trade names, slogans, or advertising matter already adopted by a competitor, or any deceptive approximation thereof.

10. Inducing or attempting to induce, by any means or device whatsoever, a breach of contract between a competitor and his customer during the term of such contract.

11. Splitting or dividing commissions, broker's fees, or brokerage discounts, or otherwise in any manner directly or indirectly using brokerage commissions or jobbers' arrangements or sales agencies for making discounts, allowances, or rebates, or prices other than those determined under this Act, to any industrial consumer or to any retailers, or to others, whether of a like or different class.

12. Selling to, or through, any broker, jobber, commission account, or sales

COAL TELLS ITS STORY

THE ECONOMY and advantages of northern Colorado lignite coal, particularly in comparison with oil and gas, are stressed in an advertising campaign conducted by Northern Colorado Coals, Inc., in northern and northeastern Colorado. The copy used also calls attention to the convenience of using automatic stokers. The campaign began in June with almost 100 per cent cooperation of producer members of the organization, and reports are that the results have been gratifying. Organized late in 1934, Northern Colorado Coals, Inc., accounts for an aggregate output of over 2,000,000 tons, or more than 90 per cent of the field (*Coal Age*, December, 1934, p. 497). Fourteen producers formed the organization at its inception, the plan being similar to that of Appalachian Coals, Inc., with modifications necessary to meet local conditions.

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agency, which is in fact or in effect an agency or an instrumentality of a retailer or an industrial consumer or of an organization of retailers or industrial consumers, whereby they or any of them secure either directly or indirectly a discount, dividend, allowance, or rebates, or a price other than that determined in the manner prescribed by this Act.

13. Violations of the provisions of the code.

It shall not be an unfair method of competition or a violation of the code or any requirement of this act (1) to sell to or through any bona fide and legitimate farmers' cooperative organization duly organized under the laws of any State, Territory, the District of Columbia, or the United States whether or not such organization grants rebates, discounts, patronage dividends, or other similar benefits to its members; (2) to sell through any intervening agency to any such cooperative organization; or (3) to pay or allow to any such cooperative organization or to any such intervening agency any discount, commission, rebate, or dividend ordinarily paid or allowed, or permitted by the code to be paid or allowed, to other purchasers for purchases in wholesale or middleman quantities.

(j) The Commission shall have jurisdiction to hear and determine written complaints made charging any violation of the code specified in this Part II. It shall make and publish rules and regulations for the consideration and hearing of any such complaint, and all interested parties shall be required to conform thereto. The Commission shall make due effort toward adjustment of such complaints and shall endeavor to compose the differences of the parties, and shall make such order or orders in the premises, from time to time, as the facts and the circumstances warrant. Any such order shall be subject to review as are other orders of the Commission.

Part III—Labor Relations

To effectuate the purposes of this Act, the district boards and code members shall accept the following conditions which shall be contained in said code:

(a) Employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from interference, restraint, or coercion of employers, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection; and no employee and no one seeking employment shall be required as a condition of employment to join any company union.

(b) Employees shall have the right of peaceable assemblage for the discussion of the principles of collective bargaining, shall be entitled to select their own check-weighmen to inspect the weighing or measuring of coal, and shall not be required as a condition of employment to live in company houses or to trade at the store of the employer.

(c) A Bituminous Coal Labor Board, hereinafter referred to as "Labor Board," consisting of three members, shall be appointed by the President of the United States by and with the advice and consent of the Senate, and shall be assigned to the Department of Labor. The chairman shall be an impartial person with no financial interest in the industry, or connection with any organization of the employees. Of the other members, one shall be a representative of the producers and one shall be a representative of the organized employees, each of whom may retain his respective interest in the industry or relationship to the organization of employees. The Labor Board shall, with due regard to the provisions of the civil-service laws and the Classification Act of 1923, as amended, appoint and fix the compensation and duties of a secretary and necessary clerical and other assistants. The members shall serve for a period of four years or until the prior termination of this Act, and shall each receive compensation at the rate of $10,000 per annum and necessary traveling expenses. Any person appointed to fill a vacancy shall be appointed only for the unexpired term of his predecessor in office. Decisions of the Labor Board may be made by a majority thereof.

(d) The Labor Board shall sit at such places as its duties require, and may appoint an examiner to report evidence for its finding in any particular case. It shall notify the parties to any dispute of the time and place of the taking of evidence, or the hearing of the cause, and its finding of facts supported by any substantial evidence shall be conclusive upon review thereof by any court of the United States. It shall transmit its findings and order to the parties interested and to the Commission. The Commission shall take no action thereon for sixty days after the entry of the order of the Labor Board; and if within such sixty days an appeal is taken under the provisions of Sec. 16 of this Act, no action on such finding and order shall be taken by the Commission during the pendency of the appeal.

(e) The Labor Board shall have authority to adjudicate disputes arising under subsections (a) and (b) of this Part III, and to determine whether or not an organization of employees has been promoted, or is controlled or dominated by an employer in its organization, management, policy, or election of representatives; and for the purpose of determining who are the freely chosen representatives of the employees the Board may order and under its supervision may conduct an election of employees for that purpose. The Labor Board may order a code member to meet the representatives of its employees for the purpose of collective bargaining.

(f) The Labor Board may offer its services as mediator in any dispute between a producer and its employees where such dispute is not determined by the tribunal set up in a bona fide collective contract; and upon the written submission by the parties requesting an award on a stated matter signed by the duly accredited representatives of the employer and employees, the Labor Board may arbitrate the matter submitted.

(g) Whenever the maximum daily and weekly hours of labor are agreed upon in any contract or contracts negotiated between the producers of more than two-thirds the annual national tonnage production for the preceding calendar year and the representatives of more than one-half the mine workers employed, such maximum hours of labor shall be accepted by all the code members. The wage agreement or agreements negotiated by collective bargaining in any district or group of two or more districts, between representatives of producers of more than two-thirds of the annual tonnage production of such district or each of such districts in a contracting group during the preceding calendar year, and representatives of the majority of the mine workers therein, shall be filed with the Labor Board and shall be accepted as the minimum wages for the various classifications of labor by the code members operating in such district or group of districts.

Organization of the Code

Sec. 5. (a) Upon the appointment of the Commission it shall at once formulate said code and assist in the organization of the district boards as provided for in Sec. 4, and shall prepare and supply to all coal producers forms of acceptance for membership therein. Such forms of acceptances, when executed, shall be acknowledged before any official authorized to take acknowledgments.

(b) The membership of any such coal producer in such code and his right to a drawback on the taxes levied under Sec. 3 of this Act, may be revoked by the Commission upon written complaint by any party in interest, after a hearing, with 30 days' written notice to the member, upon proof that such member has willfully failed or refused to comply with any duty or requirement imposed upon him by reason of his membership; and in such a hearing any party in interest, including the district boards, other code members, consumers, employees, and the Commissioner of Internal Revenue, shall be entitled to present evidence and be heard: *Provided*, That the Commission, in its discretion, may in such case make an order directing the code member to cease and desist from violations of the code and upon failure of the code member to comply with such order the Commission may reopen the case upon ten days' notice to the code member affected and proceed in the hearing thereof as above provided.

The Commission shall keep a record of the evidence heard by it in any proceeding to cancel or revoke the membership of any code member and its findings of fact if supported by any substantial evidence shall be conclusive upon any proceeding to review or restrain the action and order of the Commission in any court of the United States.

When an alleged violation of the code relates to the provisions of Part III of Sec. 4 of this Act, the Commission shall accept as conclusive the certified findings and orders of the Labor Board and inquire only into the compliance or noncompliance of the code member with respect thereto.

(c) Any producer whose membership in the code and whose right to a drawback on the taxes as provided under this Act has been cancelled, shall have the right to have his membership restored upon payment by him of all taxes in full for the time during which it shall be found by the Commission that his violation of the code or of any regulation thereunder, the observance of which is required by its terms, shall have continued. In making its findings under this subsection the Commission shall state specifically (1) the period of time during which such violation continued, and (2) the amount of taxes required to be paid to bring about reinstatement as a code member.

(d) Any code member who shall be injured in his business or property by any other code member by reason of the doing of any act which is forbidden or the failure to do any act which is required by this Act or by the code, may sue therefor in any district court of the United States in the district in which the defendant resides, or is found or has an agent, without respect to the amount in controversy, and shall recover three-fold damages by him sustained, and the cost of suit, including a reasonable attorney's fee.

Sec. 6. (a) All rules, regulations, determinations, and promulgations of any district board shall be subject to review by the Commission upon appeal by any producer and upon just cause shown shall be amenable to the order of the Commission; and appeal to the Commission shall be a matter of right in all cases to every producer and to all parties in interest. The Commission may also provide rules for the determination of controversies arising under this Act by voluntary submission thereof to arbitration, which determination shall be final and conclusive.

(b) Any person aggrieved by an order issued by the Commission or Labor Board in a proceeding to which such person is a party may obtain a review of such order in the Circuit Court of Appeals of the United States, within any circuit wherein such person resides or has his principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within 60 days after the entry of such order, a written petition praying that the order of the Commission or Labor Board be modified or set aside in whole or in part. A copy of such petiton shall be forthwith served upon any member of the Commission or Labor Board, as the case may be, and thereupon the Commission or Labor Board, as the case may be, shall certify and file in the court a transcript of the record upon which the order complained of was entered. Upon the filing of such transcript such court shall have exclusive jurisdiction to affirm, modify, and enforce or set aside such order, in whole or in part. No objection to the order of the Commission or Labor Board shall be considered by the court unless such objection shall have been urged below. The finding of the Commission or Labor Board as to the facts, if supported by substantial evidence, shall be conclusive. If either party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the hearing before the Commission or Labor Board, the court may order such additional evidence to be taken before the Commission or Labor Board and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission or Labor Board, as the case may be, may modify its findings as to the facts, by reason of the additional evidence so taken, and it shall file such modified or new findings, which, if supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, and enforcing or setting aside, in whole or in part, any such order of the Commission or Labor Board, as the case may be, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in Secs. 239 and 240 of the Judicial Code, as amended (U. S. C., Title 28, Secs. 346 and 347).

The commencement of proceedings under this subsection shall not, unless specifically ordered by the court, operate as a stay of the Commission's order.

(c) If any code member fails or neglects to obey any order of the Commission while the same is in effect, the Commission in its discretion may apply to the Circuit Court of Appeals of the United States within any circuit where such code member resides or carries on business, for the enforcement of its order, and shall certify and file with its application a transcript of the entire record in the proceeding, including all the testimony taken and the report and order of the Commission. Upon such filing of the application and transcript the court shall cause notice thereof to be

Minimum-Price Areas and Administrative Districts

served upon such code member and thereupon shall have jurisdiction of the proceeding and of the question determined therein, and shall have power to make and enter upon the pleadings, testimony, and proceedings set forth in such transcript a decree affirming, modifying, or setting aside the order of the Commission. The findings of the Commission as to facts, if supported by substantial evidence, shall be conclusive. If either party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper.

The Commission may modify its findings as to the facts or make new findings, by reason of the additional evidence so taken, and it shall file such modified or new findings, which if supported by substantial evidence shall be conclusive, and its recommendation, if any, for the modification or setting aside of its original order, with the return of such additional evidence. The judgment and decree of the court shall be final, except that the same shall be subject to review by the Supreme Court upon certiorari or certification as provided in Secs. 239 and 240 of the Judicial Code, as amended (U. S. C., Title 28, Secs. 346 and 347).

(d) The jurisdiction of the Circuit Court of Appeals of the United States or the United States Court of Appeals for the District of Columbia, as the case may be, to enforce, set aside, or modify orders of the Commission of Labor Board shall be exclusive.

Such proceedings in the Circuit Court of Appeals or the United States Court of Appeals for the District of Columbia, as the case may be, shall be given precedence over other cases pending therein, and shall be in every way expedited.

Sec. 7. All provisions of the law, including penalties and refunds, relating to the collection and disposition of internal revenue taxes, shall, in so far as applicable and not inconsistent with the provisions of this Act, be applicable with respect to taxes imposed under this Act.

Sec. 8. (a) The members of the Commission and of the Labor Board are authorized to administer oaths to witnesses appearing before their respective boards; and, for the purpose of conducting its investigations, said Commission or the said Labor Board shall have full power to issue subpenas and subpenas duces tecum, which shall be as nearly as may be in the form of subpenas issued by district courts of the United States. In case any person shall fail or refuse to obey such subpena it shall be the duty of the Commission, or the Labor Board, through its chairman, to make application to the District Court of the United States setting forth the issue and service of such subpena and the refusal of the person to obey the same and requesting such court to compel such person to appear before such court and show lawful cause for such refusal. Upon the filing of such application with the clerk of such court, it shall be the duty of the judge thereof, either in term time or vacation, to forthwith enter an order of record, requiring such person to appear before such court at a time stated in said order within three days from such entry, and show cause why he should not be required to obey such subpena, and upon his failure to show cause it shall be the duty of the court to order such witness to appear before the said Commission or Labor Board and give such testimony or produce such evidence as may be lawfully required by said Commission or Labor Board. The district court, either in term time or vacation, shall have full power to punish for contempt as in other cases of refusal to obey the process and order of such court.

(b) In the investigation of any complaint or violation of the code, or of any rule or regulation the observance of which is required under the terms thereof, the Commission or the Labor Board, as the case may be, shall have power to require such reports from, and shall be given access to inspect the books and records of, code members to the extent deemed necessary for the purpose of determining the complaint.

Sec. 9. Should any producer or producers of bituminous coal not accept and maintain membership under the code set out in Sec. 4 of this Act, he or they shall in addition to the tax herein provided and without the privilege of any drawback thereon, be held subject to other Acts of Congress regulating industries and their labor relations or providing for codes of fair competition therein: *Provided*, That the employees of all producers shall have the right of self-organization and collective bargaining through representatives of their own choosing free from the interference, restraint, or coercion of employers or their agents, all as set forth in Sec. 4, Part III (a) and (b), of this Act.

Sec. 10. (a) The Commission may require reports from producers and may use such other sources of information available as it deems advisable, and may require producers to maintain a uniform system of accounting of costs, wages, operations, sales, profits, losses, and such other matters as may be required in the administration of this Act. No information obtained from a producer disclosing costs of production or sales realization shall be made public without the consent of the producer from whom the same shall have been obtained, except where such disclosure is warranted by a controversy with the producer over any order of the Commission and except that such information may be compiled in composite form in such manner as shall not be injurious to the interests of any producer and, as so compiled, may be published by the Commission.

(b) Any officer or employee of the Commission or of any district board who shall, in violation of the provisions of subsection (a) make public any information obtained by the Commission or the district board, without its authority, unless directed by a court, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine not exceeding $500, or by imprisonment not exceeding six months, or by both fine and imprisonment, in the discretion of the court.

(c) If any producer required by this Act or the code to file a report shall fail to do so within the time fixed for filing the same, and such failure shall continue for thirty days after notice of such default, the producer shall forfeit to the United States the sum of $50 for each and every day of the continuance of such failure, which forfeiture shall be payable into the Treasury of the United States, and shall be recoverable in a civil suit in the name of the United States, brought in the district where the producer has his principal office or in any district in which he shall do business. It shall be the duty of the various district attorneys, under the direction of the Attorney General of the United States, to prosecute for the recovery of forfeiture.

Sec. 11. State laws regulating the mining of coal not inconsistent herewith are not affected by this Act.

Sec. 12. No coal may be delivered upon a contract made prior to the effective date of this Act at a price below the minimum

price at the time of delivery upon such contract, as established pursuant to Part II of Sec. 4 of this Act, and such contract shall be invalid and unenforceable: *Provided*, That this prohibition shall not apply (a) to a lawful and bona fide written contract entered into prior to Oct. 2, 1933; nor (b) to a lawful and bona fide written contract entered into subsequent to that date and prior to May 27, 1935, at not less than the minimum price current as published under the Code of Fair Competition for the Bituminous Coal Industry, pursuant to the National Industrial Recovery Act, at the time of making of such contract; nor (c) to a lawful and bona fide written contract entered into on or after May 27, 1935, and prior to the date of the approval of this Act, at not less than the minimum price for current sale as published under said code of fair competition, as at May 27, 1935.

Sec. 13. Any combination between producers creating a marketing agency for the disposal of competitive coals in interstate commerce at prices to be determined by such agency or by the agreement of the producers operating through such agency, shall be unlawful as a restraint of interstate trade and commerce within the provisions of the Act of Congress of July 2, 1890, known as the Sherman Act, and Acts amendatory and supplemental thereto, unless such marketing agency shall have been approved by the Commission as provided in Sec. 4 of this Act.

Sec. 14. (a) No bituminous coal shall be purchased by the United States, or any department or agency thereof, produced at any mine, where the producer has not complied with the provisions of the code set out in Sec. 4 of this Act.

(b) Each contract made by the United States, or any department or agency thereof, with a contractor for any public work, or service, shall contain a provision that the contractor will buy no bituminous coal to use on or in the carrying out of such contract from any producer except such producer be a member of the code set out in Sec. 4 of this Act as certified to by the National Bituminous Coal Commission.

Sec. 15. If any provision of this Act, or the application thereof to any person or circumstances, is held invalid, the remainder of the Act and the application of such provisions to other persons or circumstances shall not be affected thereby.

OTHER DUTIES OF THE COMMISSION

Sec. 16. The Commission shall study and investigate the matter of increasing the uses of bituminous coal and the problems of its importation and exportation; and shall further investigate—

(1) The economic operations of mines with the view to the conservation of the national coal resources.

(2) The safe operation of mines for the purpose of minimizing working hazards, and for such purpose shall be authorized to employ the services of the Bureau of Mines.

(3) The rehabilitation of mine workers displaced from employment, and the relief of mine workers partially employed. The Commission's findings and recommendations shall be transmitted to the proper agency of the Government for relief, rehabilitation, and subsistence homesteads.

(4) The problem of marketing to lower distributing costs for the benefit of consumers.

(5) The Commission shall, as soon as reasonably possible after its appointment, investigate the necessity for the control of production of bituminous coal and methods of such control, including allotment of output to districts and producers within such districts, and shall hold hearings thereon, and shall report its conclusions and recommendations to the Secretary of the Interior for transmission by him to Congress not later than Jan. 6, 1936.

Sec. 17. Upon substantial complaint that bituminous-coal prices are excessive, and oppressive to consumers, or that any district board, or producers' marketing agency, is operating against the public interest, or in violation of this Act, the Commission may hear such complaint, or appoint a committee to investigate the same, and its findings shall be made public; and the Commission shall make proper orders within the purview of this Act so as to correct such abuses. Complaints may be made under this section by any State or political subdivision of a State.

Sec. 18. To safeguard the interests of those concerned in the mining, transportation, selling, and consumption of coal, the Commission is hereby vested with authority to make complaint to the Interstate Commerce Commission with respect to rates, charges, tariffs and practices relating to the transportation of coal, and to prosecute the same. Before proceeding to hear and dispose of any complaint filed by another than the Commission, involving the transportation of coal, the Interstate Commerce Commission shall cause the Commission to be notified of the proceeding and, upon application of the Commission, shall permit the Commission to appear and be heard. The Interstate Commerce Commission is authorized to avail itself of the cooperation, services, records and facilities of the Commission.

Sec. 19. The term "bituminous coal" as used in this Act shall include all bituminous, semi-bituminous, and sub-bituminous coal and lignite. The term "producer" shall include all persons, firms, associations, corporations, trustees, and receivers engaged in mining bituminous coal. The term "captive coal" shall include all coal produced at a mine for consumption by the producer or by a subsidiary or affiliate thereof, or for use in the production of coke or other forms of manufactured fuel by such producer or subsidiary or affiliate.

Sec. 20. Sec. 3 of this Act shall become effective on the 1st day of the third calendar month after the enactment of this Act, unless the Commission shall not at that time have formulated the code and forms of acceptance for membership therein, in which event Sec. 3 of this Act shall become effective from and after the date when the Commission shall have formulated the code and such forms for acceptance, which date shall be promulgated by Executive order of the President of the United States. All other sections of this Act shall become effective on the day of the approval of this Act.

Sec. 21. This Act shall cease to be in effect and any agencies established thereunder shall cease to exist on and after four years from the date of the approval of this Act.

Sec. 22. There is hereby authorized to be appropriated from time to time such sums as may be necessary for the administration of this Act.

Sec. 23. This Act may be cited as the "Bituminous Coal Conservation Act of 1935."

ANNEX TO ACT—SCHEDULE OF DISTRICTS

Eastern Pennsylvania — District 1. The following counties in Pennsylvania: Bedford, Blair, Bradford, Cambria, Cameron, Centre, Clarion, Clearfield, Clinton, Elk, Forest, Fulton, Huntingdon, Jefferson, Lycoming, McKean, Mifflin, Potter, Somerset, Tioga. Armstrong County, including mines served by the P. & S. R.R. on the west bank of the Allegheny River, and north of the Conemaugh division of the Pennsylvania R.R. Fayette County, all mines on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio R.R. Indiana County, north of but excluding the Saltsburg branch of the Pennsylvania R.R. between Edri and Blairsville, both exclusive. Westmoreland County, including all mines served by the Pennsylvania R.R., Torrance, and east.

All coal-producing counties in the State of Maryland.

The following counties in West Virginia: Grant, Mineral, and Tucker.

Western Pennsylvania—District 2. The following counties in Pennsylvania: Allegheny, Beaver, Butler, Greene, Lawrence, Mercer, Venango, Washington, Armstrong County, west of the Allegheny River and exclusive of mines served by the P. & S. R.R. Indiana County, including all mines served on the Saltsburg branch of the Pennsylvania R.R. north of Conemaugh River. Fayette County, except all mines on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio R.R. Westmoreland County, including all mines except those served by the Pennsylvania R.R. from Torrance, east.

Northern West Virginia—District 3. The following counties in West Virginia: Barbour, Braxton, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Lewis, Marion, Monongalia, Pleasants, Preston, Randolph, Ritchie, Roane, Taylor, Tyler, Upshur, Webster, Wetzel, Wirt, Wood. That part of Nicholas County including mines served by the Baltimore & Ohio R.R. and north.

Ohio — District 4. All coal-producing counties in Ohio.

Michigan—District 5. All coal-producing counties in Michigan.

Panhandle — District 6. The following counties in West Virginia: Brooke, Hancock, Marshall, and Ohio.

Southern No. 1—District 7. The following counties in West Virginia: Greenbrier, Mercer, Monroe, Pocahontas, Summers. Fayette County, east of Gauley River and including the Gauley River branch of the Chesapeake & Ohio R.R. and mines served by the Virginian Ry. McDowell County, that portion served by the Dry Fork branch of the Norfolk & Western Ry. and east thereof. Raleigh County, excluding all mines on the Coal River branch of the Chesapeake & Ohio R.R. Wyoming County, that portion served by the Richland-Jewell of the Virginian Ry. lying east of the mouth of Skin Fork of Guyandot River and that portion served by the main line and the Glen Rogers branch of the Virginian Ry.

The following counties in Virginia: Montgomery, Pulaski, Wythe, Giles, Craig, Tazewell County, that portion served by the Dry Fork branch to Cedar Bluff and from Bluestone Junction to Boissevain branch of the Norfolk & Western R.R. and the Richlands-Jewell Ridge branch of the Norfolk & Western R.R. Buchanan County, that portion served by the Richland-Jewell Ridge branch of the Norfolk & Western R.R. and that portion of said county on the headwaters of Dismal Creek east of Lynn Camp Creek (a tributary of Dismal Creek).

Southern No. 2—District 8. The following counties in West Virginia: Boone, Clay, Kanawha, Lincoln, Logan, Mason, Mingo, Putnam, Wayne, Cabell. Fayette County west of but not including mines of the Gauley River Branch of the Chesapeake & Ohio R.R. McDowell County, that portion not served by and lying west of the Dry Fork branch of the Norfolk & Western R.R. Raleigh County, all mines on the Coal River branch of the Chesapeake & Ohio R.R. and north thereof. Nicholas County, that part south of and not served by the Baltimore & Ohio R.R. Wyoming County, that portion served by Gilbert branch of the Virginian R.R. lying west of the mouth of Skin Fork of Guyandot River.

The following counties in Virginia: Dickinson, Lee, Russell, Scott, Wise. All of Buchanan County except that portion on the headwaters of Dismal Creek east of Lynn Camp Creek (tributary of Dismal Creek) and that portion served by the Richlands-Jewell Ridge branch of the Norfolk & Western Ry. Tazewell County, except portions served by the Dry Fork branch of Norfolk & Western Ry. and

Coming Meetings

- International Railway Fuel Association: annual meeting, Sept. 18-19, Hotel Sherman, Chicago.
- New River and Winding Gulf Mining Institute: safety meet, Sept. 13, Mount Hope, W. Va.
- Kanawha Valley Mining Institute: safety meet, Sept. 21, Montgomery, W. Va.
- West Virginia State Safety Day: first-aid meet, Sept. 28, Beckley, W. Va.
- Joint engineers' meeting and inspection trip to mines and industries in the community under auspices of anthracite sections of American Institute of Electrical Engineers, American Society of Mechanical Engineers, and American Institute of Mining and Metallurgical Engineers, Sept. 28, Mallow-Sterling Hotel, Wilkes-Barre, Pa. W. H. Lesser, Scranton, Pa., chairman, committee on arrangements.
- West Virginia Coal Mining Institute: annual meeting, Oct. 4-5, Beckley, W. Va.
- National Safety Council: 24th annual safety congress, Oct. 14-18, Louisville, Ky.
- Midwest Power Show: Oct. 14-18, Chicago, Ill.
- Coal Division of American Institute of Mining and Metallurgical Engineers: fall meeting, Oct. 28 and 29, St. Louis, Mo.
- Illinois Mining Institute: annual fall meeting, Nov. 8, Hotel Abraham Lincoln, Springfield, Ill.

branch from Bluestone Junction to Boissevain of Norfolk and Western Ry. and Richlands-Jewell Ridge branch of the Norfolk & Western Ry.

The following counties in Kentucky: Bell, Boyd, Breathitt, Carter, Clay, Elliott, Floyd, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Letcher, Leslie, McCreary, Magoffin, Martin, Morgan, Owsley, Perry, Pike, Rockcastle, Wayne, Whitley.

The following counties in Tennessee: Anderson, Campbell, Claiborne, Cumberland, Fentress, Morgan, Overton, Roane, Scott.

The following counties in North Carolina: Lee, Chatham, Moore.

West Kentucky—District 9. The following counties in Kentucky: Butler, Christian, Crittenden, Daviess, Hancock, Henderson, Hopkins, Logan, McLean, Muhlenberg, Ohio, Simpson, Todd, Union, Warren, Webster.

Illinois—District 10. All coal-producing counties in Illinois.

Indiana—District 11. All coal-producing counties in Indiana.

Iowa—District 12. All coal-producing counties in Iowa.

Southeastern—District 13. All coal-producing counties in Alabama.

The following counties in Georgia: Dade, Walker.

The following counties in Tennessee: Marion, Grundy, Hamilton, Bledsoe, Sequatchie, White, Van Buren, Warren, McMinn, Rhea.

Arkansas-Oklahoma — District 14. The following counties in Arkansas: All counties in the State.

The following counties in Oklahoma: Haskell, Le Flore, Sequoyah.

Southwestern—District 15. All coal-producing counties in Kansas. All coal-producing counties in Texas. All coal-producing counties in Missouri.

The following counties in Oklahoma: Coal, Craig, Latimer, Muskogee, Okmulgee, Pittsburg, Rogers, Tulsa, Wagoner.

Northern Colorado — District 16. The following counties in Colorado: Adams, Arapahoe, Boulder, Douglas, Elbert, El Paso, Jackson, Jefferson, Larimer, Weld.

Southern Colorado—District 17. The following counties in Colorado: All counties not included in northern Colorado district.

The following counties in New Mexico: All coal-producing counties in the State of New Mexico, except those included in the New Mexico district.

New Mexico—District 18. The following counties in New Mexico: Grant, Lincoln, McKinley, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Socorro.

Wyoming—District 19. All coal-producing counties in Wyoming.

Utah — District 20. All coal-producing counties in Utah.

North Dakota-South Dakota — District 21. All coal-producing counties in North Dakota. All coal-producing counties in South Dakota.

Montana—District 22. All coal-producing counties in Montana.

Washington—District 23. All coal-producing counties in Washington.

Architectural Contest Boosts Automatic Coal Heat

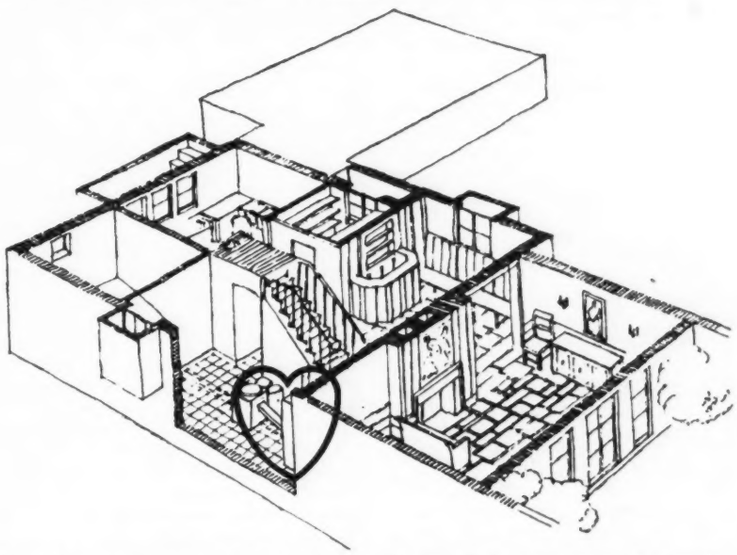
Architects who for years have lavished their skill on exterior design and the planning of more attractive living quarters from the first floor and up have been led back to the basement and made conscious of the desirability of automatic coal heat as an integral part of the modern home. The 1935 *Pencil Points* architectural competition for small house design, sponsored at the invitation of that publication by the Iron Fireman Manufacturing Co., was the driving force which changed basement design from an afterthought to a central feature of planning. Hundreds of designs were submitted. First prize went to Amedeo Leone, Detroit, Mich. There were three other prizes and mention for 25 other designs that survived the initial elimination work of the judges.

The competition, as stated by *Pencil Points* when architects were invited to submit plans this spring, called for "the design of a house for gracious and, so far as may be, effortless living, in which an American buiness man, his wife, three-year old daughter, two sons aged seven and twelve can, with the aid of a general houseworker who lives in, enjoy the comforts of a well-planned and intelligently mechanized home—a house which will be an asset to the community in that it is 'neighborly' in all that term implies." The hypothetical client, it was explained, wants to utilize the basement for other than mechanical purposes; he wants the rooms before the first-floor level suitable for recreation for both adults and children and insists upon automatic coal heat.

Seven prominent architects formed the jury of award. Dwight James Baum, New York City, was chairman, and his fellow jurymen were: Edward W. Donn, Washington, D. C.; Walter S. Frazier, Chicago; Ralph W. Gray, Boston, Mass.; James M. Hamilton, Cleveland, Ohio; Hal F. Hentz, Atlanta, Ga.; and Edwin H. Hewitt, Minneapolis, Minn. Russell F. Whitehead, editor, *Pencil Points*, and Kenneth Reid, managing editor, acted as professional and assistant professional adviser, respectively, to the jury. The first prize was $1,000; second, $500; third, $250; and fourth, $100. Four prizes of $50 each were given for "mention commended." John Floyd Yewell, New York, won both third prize and a "mention commended."

High Safety Record in Ohio

Forty-five Ohio coal mines worked six months without a chargeable accident in a State-wide safety contest ending June 30. According to Thomas P. Kearns, of the division of safety and hygiene, Ohio Industrial Commission, which sponsored the contest, 9,355,652 tons of coal was produced with 795 lost-time injuries, including 24 fatalities. This is at the rate of 11,768 tons per accident and 389,571 tons per fatality. Leaders among coal-mine groups were: Thorn Hill Coal Co., Jobs Hollow; Glenview Coal Co., Bridgeport; Lost Run Coal Co., Rutland; Wheeling Township Coal Mining Co., Duncanwood; and East Fairfield Coal Co., Youngstown.



Above, Front Elevation of Prize-Winning Design; Below, Basement Perspective—"The Heart of the Heat-Comfort Problem."

Coal Company Wins Decision In Gob Fire Case

Said to establish a precedent in litigation over burning gob piles, a three-judge bench in the Allegheny County (Pennsylvania) common pleas court refused in July to enjoin the McKeesport Coal & Coke Co., McKeesport, Pa., from dumping refuse on its property adjacent to the tipple, notwithstanding the fact that a 500,000-ton-pile of gob had been ignited by spontaneous combustion in the fall of 1933 and was burning there.

The case, it is reported, has not and will not be appealed to the Pennsylvania Supreme Court.

The lower court acceded to a request by complainants approximately one year after the fire started that the company be prevented from adding to the burning pile, but allowed it to start a new pile. Subsequently, the issue was brought to trial, complainants requesting that the company be estopped from adding to the new pile or piling refuse any place near it or the burning pile. This the court refused to do on the grounds that such practices were a necessary part of mining, that annoyance suffered by persons living in the vicinity was trivial compared to the harm that would be done the community if the mine were forced to close, that complainants, living in an industrial district, must put up with some measure of annoyance resulting from an industry and because "the piling of gob, slate and other refuse is a natural, necessary and unavoidable incident to ordinary and proper mining and a gob fire is an inevitable and unavoidable corollary of a gob pile."—*Versailles Borough v. McKeesport Coal & Coke Co.*, 56 Pgh. L. J. 379.

Meriden Mine Reopened

The Marneva Coal Co., of which J. W. Galloway is president, has taken over the Meriden mine, near Philippi, Barbour County, West Virginia, and placed it in operation after seven years of idleness. Before its shutdown, in 1928, the mine was operated by the Rock Island Coal Co. Though only one mine is being worked at present, further development is to be made later. For the present, about 300 tons will be loaded daily, with 50 men at work. Other officers of the Marneva company are: O. E. Harwood, vice-president and treasurer; William E. Stafford, general manager, and A. A. Sterling, secretary.

Personal Notes

JOHN BOYLAN, of Scranton, Pa., for the last six years president of District 1, United Mine Workers, resigned that office July 31 to become secretary of the Anthracite Conciliation Board. He succeeds the late Chris Golden. MICHAEL J. KOSIK, former vice-president of District 1, moves up to the presidency, and JOHN T. SULLIVAN succeeds Mr. Kosik as vice-president.

JOHN M. CARMODY, for the past year a member of the National Railway Mediation Board, has been appointed a member of the National Labor Relations Board authorized by the Wagner trades-dispute measure enacted at the session of Congress which ended last month. Mr. Carmody was named by President Roosevelt for a three-year term on the new board. Prior to his appointment to the National Railway Mediation Board, Mr. Carmody, formerly editor of *Coal Age*, had been serving as the impartial member of Division I—North Labor Board under the NRA bituminous-coal code and as chief engineer of the Federal Emergency Relief Corporation.

Blank & Stoller

The Late James Ross Campbell

J. H. EDWARDS, associate editor, *Coal Age*, has been reappointed to membership on the committee on applications to mining work of the American Institute of Electrical Engineers for the year ending July 31, 1936.

WAYNE P. ELLIS, deputy administrator, Bituminous Coal Code, in old NRA Division I, has announced that he will retire from NRA Sept. 1. His long association with the coal industry has included the following connections: zoning commissioner, National Fuel Administration; secretary, Logan County (W. Va.) Coal Operators' Association; secretary, Davis Coal & Coke Co.; assistant to the president, Pittsburgh Terminal R.R. & Coal Co.; secretary and manager, Northwestern Coal Dock Operators' Association and the Ellis Coal Bureau; Northwest sales manager, Berwind Fuel Co.

H. S. GILBERTSON, hitherto director of personnel, Lehigh Navigation Coal Co., has been appointed director of research and personnel. Other changes announced by the company are: EVAN EVANS, district superintendent, Coaldale district, appointed operating assistant in charge of labor matters. E. P. HUMPHRIES, supervisor of preparation, mechanical department, appointed superintendent of preparation and strippings. C. D. RUBERT, district superintendent, Tamaqua district, transferred to same position in Coaldale district. F. E. STERNER, district engineer, Nesquehoning district, named district superintendent of Tamaqua district.

James R. Campbell Dies

James Ross Campbell, 58, since early in 1934 special representative for fuel problems in both field and market for the Island Creek Coal Co. at Cincinnati, Ohio, died Aug. 6, at his home in Scottdale, Pa., after a week's illness. Born at Charles City, Iowa, Mr. Campbell was graduated in 1898 from Rio Grande College, at Rio Grande, Ohio, where he specialized in water analysis. Following his graduation he was professor at Duquesne University, Pittsburgh, Pa., for two years, teaching mathematics and chemistry. Becoming chief chemist of the H. C. Frick Coke Co., he made many important studies into the operation and particularly the pyrometry of the beehive oven, the distribution of phosphorus in the coal bed, the desirability of basic coke, the production of ferric oxide from the "sulphur water" of coal mines and the possible utilization of ferrous and ferric hydrate in agriculture. In 1924 and for five years thereafter, he was chief chemist of the Hudson Coal Co., which concern he left to become special representative of the American, later the Koppers, Rhéolaveur Co.

To Operate in Richmond Field

Plans of the Great Southern Morgan Coal & Coke Corporation to finance coal-mining operations in the Richmond field of Virginia by the issuance of $500,000 in securities have been sanctioned by the State Corporation Commission, and operation is to be started soon, according to counsel for the company. H. W. Morgan, president, Morgan Coal Co., heads the new company.

Mining in this field began nearly 100 years ago, but has been at a standstill in recent years. The Morgan company, it has been announced, will not attempt to work old mines but will sink diagonal shafts along beds slanting about 30 deg. downward from the narrow sides of the basin. Although the company has under lease 3,150 acres in Chesterfield and Powhatan counties, operation will be on a small scale until it is shown that mining on a commercial scale is warranted. An important feature of the project is that coal shipments from the property can be made via tidewater.

Developing New Southern Mine

A new mine, near Clairfield, Tenn., is being developed by the Black Diamond Coal Mining Co., Birmingham, Ala. It is a drift opening in the Jellico seam, and will have rail connection with the Southern and Louisville & Nashville railroads. The operation will be developed to a capacity of 750 to 1,000 tons daily, mining machines and mechanical loaders being employed. Electric haulage, with loading booms, will be utilized, and preparation equipment will include shaking and vibrating screens. Dwellings and other facilities for miners are under construction, as well as commissary, office and other mine structures. The plant is expected to be ready for operation by Dec. 1, according to Carl McFarlin, Birmingham, general superin-

tendent. H. M. Rutland is superintendent of the new mine.

Steady production has begun at the No. 2 Bankhead (Ala.) mine of the Cane Creek Coal Mining Co., which had been in course of development for several months. It is equipped with a belt conveyor. Production is expected to reach 1,000 tons daily.

Sessions on Mine Safety at National Safety Congress

Three sessions on safety in mines will be held at the Twenty-fourth Safety Congress and Exposition of the National Safety Council, in the Brown Hotel, Louisville, Ky., Oct. 15-17. J. F. Daniel, chief, Kentucky Department of Mines and Minerals, will discuss the problems of State mining departments in promoting mine safety; Isadore Lubin, U. S. Commissioner of Labor Statistics, the necessity for accurate accident records in mining; P. C. Thomas, vice-president, Koppers Coal & Transportation Co., safety from the executive viewpoint; Ralph Kirk, safety engineer, Philadelphia & Reading Coal & Iron Co., discipline and its relation to safety in anthracite mining, and two other speakers, yet to be announced, the same subject in relation to bituminous mining and iron-ore mining.

D. Harringon, U. S. Bureau of Mines, will present the problem whether new hazards are being introduced in coal mines faster than existing hazards are being eliminated; T. W. Osgood, safety engineer, Metropolitan Water District of Southern California, will describe accident-prevention methods on the Colorado aqueduct; William Roy, safety director, M. A. Hanna Co., will detail his company's system of safeguarding the health of employees and their families; and A. D. Campbell, safety engineer, McIntyre Porcupine Mines, Ltd., safety and health practices in the mines of northern Ontario.

Two addresses will be made on Oct. 18 at the Kentucky Hotel at a special session on occupational diseases, one by F. R. Jones, general manager, Association of Casualty and Surety Executives, on present and prospective occupational-disease legislation, and one by Edgar Mayer, assistant professor of clinical medicine, Cornell Medical College, on the diagnosis of silicosis.

Addresses on public speaking in safety work and safety in foremanship will be given at the Kentucky Hotel in the mornings prior to these several meetings.

Transportation Theme of Technical Session At Pocahontas Institute Meeting

UNDERGROUND transportation was the theme of the technical session rounding out a three-day meeting and exhibit of mining equipment and supplies held by the Pocahontas Mechanical & Electrical Institute at Bluefield, W. Va., Aug. 22-24. With T. A. Martin, electrical engineer, Peerless Coal & Coke Co., and secretary-treasurer of the institute, occupying the chair in place of S. S. Cooper, electrical engineer, American Coal Co. of Allegany County, and institute president, who suffered a mild attack of hoarseness, Charles E. Lawall, head, School of Mines, West Virginia University, traced the history of mining and thus explained the persistence with which the public associates the coal industry with conditions and methods of long ago.

"It is an economic crime to purchase locomotives without anti-friction bearings throughout, and especially without that type of bearing on the suspension," said B. F. Grimm, consulting electrical engineer, Koppers Coal & Transportation Co., in a paper on transportation, which he classed as the principal factor usually determining the daily tonnage capacity of a mine. Discussing cars, he declared that larger capacities often increase the production in direct proportion without increasing any of the expense items such as track, ventilation, drainage, section bosses, salaried employees and preparation.

Referring to gathering locomotives Mr. Grimm expressed the opinion that 4 m.p.h. is fast enough for a well-planned mining system and that units permanently connected in series and without drive chains between axles render excellent service. "The best means developed to date for getting permanently reliable track joints is to weld them," was his conclusion on the maintenance of strong and rigid main haulage tracks of high electrical conductivity. Thermit welds have been applied to rail joints on 3,500 ft. of 60-lb. track in an Ohio mine.

Locomotive maintenance is reduced by thermal sustained overload protection. "Nothing is ever gained by an occasional overload that permanently damages insulation or melts solder in commutator risers," he asserted, or "at least no one has ever given me a concrete example of where the profit from extra coal hauled offset the subsequent tonnage losses and repair expense."

Mentioning $70 as the approximate monthly overhead expense on a modern gathering locomotive, Mr. Grimm called attention to the economic possibilities of rebuilding old locomotives with modern features. Among the specifications which he listed as necessary for the ideal locomotive were the following: all wheels chained or geared together, anti-friction bearings, interlocks between starting resistance and braking (excepting possibly on the first point) and dynamic or regenerative braking.

"No haulage system can be better than the track over which the moving units must run," was the point made by J. B. Haskell, superintendent, frog and switch department, West Virginia Rail Co., in discussing mine tracks and tracklaying. Selection of the proper rail size for work to be done is of first importance in securing good results, but it is necessary also to use high-grade materials.

For room tracks, 30-lb. rail is the most widely used; 20-lb. is next, and the 25-lb. size stands in third place. Forty-pound rail finds wide usage for butt entries. However, for main haulage in West Virginia the 56- and 60-lb. weights are most extensively employed.

Tests of lateral stiffness indicate that a joint made by half splices is only 55 per cent as stiff as an angle-bar joint. Therefore, where splice bars are used, the tie should be under the joint, but where angle bars are used, the joint should be midway between the two ties.

Steel ties now predominate in room work and find wide usage in holding to correct gage main-line rails resting on wood ties. Mr. Haskell emphasized the importance of utilizing standard formulas rather than short-cut methods for figuring turnouts and also of selecting materials that fit properly with each other, then following closely the standard diagrams of installation.

Ninety-Four Concerns Exhibit

Ninety-four manufacturers and distributors of equipment were represented at the industrial exhibit held at the Norfolk & Western Ry. freight station under the direction of A. F. Marshall, Pocahontas Operators' Association. Attendance on the last day, when only coal men were admitted, was 2,800. The list of exhibitors included:

Ahlberg Bearing Co., Allis-Chalmers Mfg. Co., Air Reduction Sales Co., American Car & Foundry Co., American Mine Door Co., American Brake Shoe & Foundry Co., American Steel & Wire Co., Anaconda Wire & Cable Co., Appalachian Electric Power Co., Beckley Machine & Electric Co., Benjamin Moore & Co., Bethlehem Steel Co., Bluefield Hardware Co., Bluefield Supply Co., Brown-Fayro Co., Black Hawk Mfg. Co., Boston Woven Hose & Rubber Co., Bluefield *Daily Telegraph* and Sunset *News*.

Carnegie Steel Co., Charleston Electrical Supply Co., Century Electric Co., Columbian Vise & Mfg. Co., Citizens' Coal & Supply Co., Deming Co., Dayton Rubber Mfg. Co., Electric Railway Equipment Co., Electric Railway Improvement Co., Fafnir Bearing Corporation, Frank Prox Co., French Sand Dryer Co., General Cable Corporation, B. F. Goodrich Rubber Co., Goulds Pumps, General Shale Products Co., General Electric Co., Goodman Mfg. Co., Ideal Commutator Dresser Co., Ingersoll-Rand Co., Jeffrey Mfg. Co., Joyce-Cridland Co., Kanawha Mfg. Co.

A. Leschen & Sons Rope Co., Linde Air Products Co., Link-Belt Co., Mosebach Electric & Supply Co., Manhattan Rubber Mfg. Co., MRC Bearing Service Co., Mine Safety Appliances Co., National Carbon Co., National Electric Coil Co., Norfolk & Western Ry., Ohio Brass Co., Penn Machine Co., Post-Glover Electric Co., Persinger Supply Co., Pure Carbon Co., Portable Lamp & Equipment Co., Pocahontas Operators' Association, Racine Tool & Machine Co., Robinson Ventilating Co., Rockbestos Products Corporation.

Safety First Supply Co., Safety Mining Co., Sanford-Day Iron Works, Simplex Wire & Cable Co., Sockum Coal Cleaner, Southern Oxygen Co., SKF Industries, Inc., Streeter-Amet Co., Sun Oil Co., Superior Sterling Co., Spray Engineering Co., Standard Oil Co., Square D Co., Templeton, Kenly & Co., Timken Roller Bearing Co., Trumbull Electric Mfg. Co., Toledo Scale Co., Torchweld

Equipment Co., Tyson Roller Bearing Corporation.

Van Dorn Electric Tool Co., Virginia Polytechnic Institute, Weinman Pump Mfg. Co., Westinghouse Electric & Mfg. Co., Westinghouse Lamp Co., West Virginia Armature Co., West Virginia Rail Co., West Virginia University and Williamson Supply Co.

Obituary

EDWIN CORNELIUS LUTHER, 57, president and general manager of the Peerless Coal & Coke Co. and president of the Powhatan Coal & Coke Co., both operating in McDowell County, West Virginia, died suddenly Aug. 8 at Palmerton Hospital, Pottsville, Pa. While testifying at a coal-tax hearing in Mauch Chunk, Pa., he was stricken with apoplexy. A graduate of Princeton in civil engineering and of Columbia in mechanical engineering, Mr. Luther was for four years a mining engineer for the Philadelphia & Reading Coal & Iron Co., after which he became engineer for the estate of P. W. Sheafer. In 1916 he became a consultant in both anthracite and bituminous mining and served as agent for large coal estates.

JOHN PRICE, 71, consulting engineer for the Penn Anthracite Mining Co., died Aug. 22, at his home in Scranton, Pa., following a long illness. Born in South Wales, he came to this country about 45 years ago and settled in the anthracite region, where he was employed at various operations, becoming general superintendent of Madeira, Hill & Co. Subsequently he became an efficiency engineer for the Hudson Coal Co. before joining Penn Anthracite.

W. E. SHANNON, 73, president, Shannon Co., which operates a bituminous mine at Dudley, in the Broad Top field of Pennsylvania, died July 22.

H. M. POOLE, 65, president of the Norwood-White Coal Co., Des Moines, Iowa, which also controls the Carbon Mining Co., died Aug. 24. He had been chairman of the Iowa Subdivision of Division II Coal Code Authority and president of the Iowa Coal Trade Association.

FRANK L. FLETCHER, 49, research manager of Appalachian Coals, Inc., died July 27 at the Jewish Hospital, Louisville, Ky., of heart trouble following an illness of nine months. Mr. Fletcher formerly was manager of the Logan County Coal Corporation at Cincinnati, Ohio, for seven years. He also had been superintendent of terminals at Louisville for the Chesapeake & Ohio, Big Four and the Louisville & Jeffersonville Bridge Co. Later he was transferred to Huntington, W. Va., as general superintendent of the C. & O., resigning to go into the coal business.

ROBERT W. CONROW, 68, retired manager of sales, universal pipe department of the Central Foundry Co., New York, died Aug. 11 at the Columbia-Presbyterian Medical Center. He served in Puerto Rico with Squadron A during the Spanish-American War.

LUCIUS W. ROBINSON, 79, eminent for many years in the coal industry, died Aug. 15 at his home in Rochester, N. Y., after a prolonged illness. His connection with the industry began with the Iselin interests in Tioga County, Pennsylvania, shortly after his graduation as a mining engineer from Yale University, in 1877. Within a few years he was an important figure in the development of bituminous mining in the Punxsutawney region of Pennsylvania. Marketing of the output of operations over which he had control was largely responsible for development of the railroad which afterward became the Buffalo, Rochester & Pittsburgh. He took an active part in founding the Rochester & Pittsburgh Coal & Iron Co., later becoming chairman of the board of that company as well as of the Jefferson & Clearfield Coal & Iron Co. On his retirement a few years ago he also was president of the Pittsburgh Gas Coal Co., Brush Creek Coal Mining Co., Adrian Furnace Co. and Punxsutawney Furnace Co., and vice-president of the Cowanshannock Coal & Coke Co.

HENRY BRIGGS, 52, professor of mining at Heriot-Watt College since 1919 and first occupant of the Hood chair of mining, established at the University of Edinburgh in 1924, died Aug. 26 in London. Educated at Bradford and the Royal Academy of Science, he became an associate at the Royal School of Mines in 1903. Later he lectured on mine surveying at the University of Birmingham, besides engaging in several mining projects in Yorkshire, Cumberland and Wales, being appointed to the faculty of Heriot-Watt College in 1907. He served as experimental director of Mine Rescue Research (Science and Industry Research Department) from 1917 to 1920 and was a member of the oxygen research committee from 1918 to 1921. He was noted for his activity in behalf of safety in mining and was widely known as an educator. He also was a frequent contributor to the technical press, some of his articles on ventilation and mine explosions appearing in *Coal Age*.

Industrial Notes

HARRY W. BEEDLE has been appointed manager of the Boston (Mass.) branch of the Electric Storage Battery Co. He has been associated with the company for 35 years, the last 15 as assistant manager of the Boston office.

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J., announces that J. H. BROWN has been appointed regional manager of its mining and construction division, covering Mid-Western territory, with headquarters in Chicago. He was formerly Eastern sales manager of the Sullivan Machinery Co.

REPUBLIC STEEL CORPORATION announces the opening of a new sales office Sept. 1 in the Dwight Building, Kansas City, Mo., in charge of ROBERT L. PIERCE, of the St. Louis (Mo.) office.

To Reopen Diamond Mine

The Diamond mine, formerly operated by the Glen Alden Coal Co., will be reopened and developed by the Monarch Anthracite Mining Co., which is leasing the Diamond property. An operating agreement has been executed between the Scranton Coal Co. and the Monarch company, under which the Diamond coal will be sent to the Pine Brook plant of the Scranton company for preparation. James H. Pierce, chairman of the board, Scranton Coal Co., is also president of the Monarch company, which was organized a few months ago.

Mine Death Rate Improves

Coal-mine accidents caused the deaths of 60 bituminous and 28 anthracite miners in June, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. This compares with 74 bituminous and 30 anthracite fatalities in the preceding month, and 50 bituminous and 13 anthracite deaths in June, 1934. With a production of 30,264,000 tons, the bituminous death rate in June was 1.98 per million tons, compared with 2.76 in the preceding month, when 26,790,000 tons was mined, and 1.93 in June, 1934, in mining 25,877,000 tons. The anthracite fatality rate in June was 4.96, based on an output of 5,642,000 tons. In the preceding month the rate was 6.10 on an output of 4,919,000 tons, and in June, 1934, it was 3.11 in producing 4,184,000 tons. For the two industries combined, the death rate in June was 2.45, against 3.28 in the preceding month and 2.09 in June, 1934.

Comparative fatality rates for the first six months of 1934 and 1935, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

Cause	Bituminous		Anthracite		Total	
	Number killed	Killed per million tons	Number killed	Killed per million tons	Number killed	Killed per million tons
January-June, 1934						
Falls of roof and coal	245	1.344	76	2.319	321	1.492
Haulage	73	.401	17	.519	90	.418
Gas or dust explosions:						
Local explosions	5	.027	10	.305	15	.070
Major explosions	...	.....	...	.....	...	.....
Explosives	15	.082	7	.214	22	.102
Electricity	20	.110	3	.092	23	.107
Machinery	7	.038	2	.061	9	.042
Surface and miscellaneous	53	.291	31	.946	84	.391
Total	418	2.293	146	4.456	564	2.622
January-June, 1935						
Falls of roof and coal	236	1.250	76	2.653	312	1.435
Haulage	103	.546	15	.524	118	.542
Gas or dust explosions:						
Local explosions	10	.053	7	.244	17	.078
Major explosions	...	.....	13	.454	13	.060
Explosives	16	.085	9	.314	25	.115
Electricity	12	.063	..	.....	12	.055
Machinery	12	.063	1	.035	13	.060
Surface and miscellaneous	44	.233	39	1.362	83	.382
Total	433	2.293	160	5.586	593	2.727

*All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

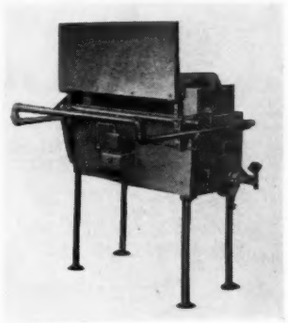
RUBBERIZING

Self-Vulcanizing Rubber Co., Inc., Chicago, offers "Self-Vulc" liquid and plastic rubber for protecting inside and outside surfaces against abrasion, corrosion and acids; restoring surfaces worn away by the above agents; protecting surfaces subject to impact; and for silencing noises. Application of the liquid type, according to the company, has been improved by the development of a new priming compound giving good results with only a single priming coat. Both the priming liquid and the liquid rubber can be applied in the same ways as paint. The rubber vulcanizes itself when exposed to the air. The plastic type is applied with a spatula or other flat tool and, like the liquid, the company states, requires only one priming coat and vulcanizes itself cold in the air.

DRILL SHARPENER; FURNACE

Ingersoll-Rand Co., Phillipsburg, N. J., offers the new 54 drill sharpener and 27F oil furnace for the permanent blacksmith shop. Great power and range of utility are claimed for the sharpener, which will handle bit gages up to 3⅜ in. (5 in. in the HL-54 model) and steel sections up to 2 in. Height is 58 in.; width, 41 in.; and length, 51 in. Largest diameter of base is 34 in.

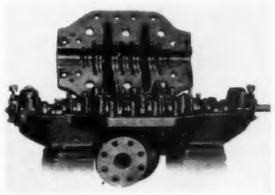
The 27F furnace is described as a low-pressure-type oil unit which can be equipped with



a temperature-control device to regulate automatically the fuel and air to maintain a constant desired temperature. It has ample capacity to serve two sharpeners when placed between them, it is stated. Hearth capacity is: 1¼-in. bits, 21; 2-in., 13; 2½-in., 10. Air consumption is 10 to 20 c.f.m.; oil, 2 to 4 gal. per hour.

MULTI-STAGE PUMP

Allis-Chalmers Mfg. Co., Milwaukee, Wis., offers Type "MM" multi-stage centrifugal pumps for heads from 400 to 1,600 ft. and capacities up to 400 g.p.m. "MM" pumps,



which follow the general lines of the "M" pumps, are horizontal-shaft, split-casing, double-suction and bronze-fitted. Use of double-suction runners, according to the company, equalizes end thrust and eliminates internal balancing arrangements. Each stage of the casing has a spiral volute and between stages the liquid flows from one volute into an exceptionally long diffusion nozzle and then into a long-sweep return bend to the inlet passages of the following stage. This construction, it is stated, results in maximum practical recovery of pressure between stages, as the liquid is directed along smooth flow lines without sudden changes in velocity.

HARD-SURFACING ELECTRODE

A hard-surfacing electrode for building up straight carbon steel, low-alloy or high-manganese-steel surfaces to resist abrasion is announced by the Lincoln Electric Co., Cleveland, Ohio. The electrode, designated "Abrasoweld," is available in a diameter of $\frac{3}{16}$ in. and a length of 14 in. It is used with reversed polarity with a current range of 125 to 200 amp. at 24 to 27 volts.

CHURN DRILL

For holes up to 300 ft. in depth and up to 6 in. in diameter in small quarries and mines and at construction, coal-stripping and prospecting operations, Bucyrus-Erie Co., South Milwaukee, Wis., offers the Bucyrus-Armstrong 21-W churn-type drill capable of handling 1,000 lb. of tools. The unit, of welded all-steel construction with Bucyrus-Armstrong rubber shock absorber, is of the one-man type and is driven by a heavy-duty 4-cylinder industrial gasoline engine. Choice of mounting is available: truck; two- or four-wheel trailer; or team or tractor haul.

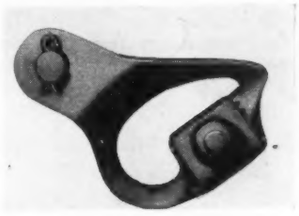
TESTING SCREEN

Paterson Engineering Co. —Arthur T. Ward, New York City, distributor—offers the Paterson vibratory testing screen, for which two major features are claimed: ability to adjust vibration exactly to suit the material and a simple method of holding in the screen cloths and effecting their quick replacement. Specifications are: height, 32 in.; weight, 75 lb.; sieve basket, 18 in. diameter, 5 in. deep;

vibrations, 1,100 to 1,200 per minute; throw of motion, 0 to $\frac{3}{8}$ in.; motor, operating off any light circuit, $\frac{1}{6}$ hp.

STRAIN CLAMP

Ohio Brass Co., Mansfield, Ohio, offers the new "Baby Universal" strain clamp, which it characterizes as a smaller, lower-cost Universal

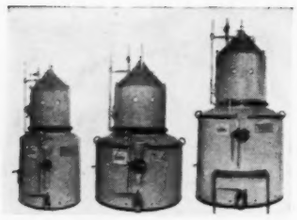


clamp for No. 6 to No. 2 cables. In principle of design, the new clamp, it is stated, is exactly like the larger unit.

WELDING AIDS

Linde Air Products Co., New York City, offers three new acetylene generators of the medium-pressure type for stationary service. These generators, bearing the designation Oxweld Type MP-5, have carbide capacities of 150, 300 and 500 lb., respectively, with acetylene generating capacities ranging from 300 to 1,000 cu.ft. per hour. Automatic operation, rapid emptying and charging, efficient operation, long life, easy access to operating parts for inspection and adjustment and listing by the Underwriters' Laboratories, Inc., are features noted by the company.

The Linde organization also offers the new Purox No. 35 general-duty medium-pressure welding torch. Constructed of extruded brass, Monel metal and drawn copper, with silver-



MP-5 Generators

soldered tubes this torch is strong and can withstand rough treatment, it is pointed out. Its range of usefulness, it is declared, makes it equally adaptable to the lightest as well as the heaviest work found in any welding shop. The torch is listed by the Underwriters' Laboratories.

BEARINGS

Norma-Hoffmann Bearings Corporation, Stamford, Conn., announces that its line of "GreaSeal" felt - protected "Precision" ball bearings has been exended to include three larger sizes: 40-, 45- and 50-mm. bore. The line includes three series: "7,000," with single felt seal; "7,000-P," with single felt seal and plate shield; and "77,000," with double felt seal. The two latter series are fully inclosed for retention of lubricant and exclusion of dirt and moisture.

BREAKER

Worthington Pump & Machinery Co., Harrison, N. J., offers the new "No. 10 Master Breaker," which it describes as a powerful, easy running unit for heavy demolition and kindred work, also easily convertible into the "No. 10 SD Master Sheeting Driver." It is said to be easily operated by one man. If desired, either the breaker or the sheeting driver may be purchased as a separate unit. Net weight of the breaker is 82 lb.; over-all length, without tools, 29 in.

BLUEPRINT PAPER

C. F. Pease Co., Chicago, offers the Pease "K" non-bleeding speed paper and cloth for blueprints and blue-line prints. These materials, the company points out, were made possible by the Pease "K" speed sensitizing solution, which allows an unusually wide range of exposure and proves that the running, or bleeding, of the blues into the white areas on fully-exposed prints results in their burned-out appearance. Consequently, full or even overexposure is said to be possible with retention of a deep, lustrous blue, and clean, clear white lines. The non-bleeding feature also facilitates the making of blue-line prints, according to the company, as it is now unnecessary to block out behind each blue-line print. Color-fastness is an additional feature offered by the maker. The new cloths and paper are available in all standard lengths, widths, weights and rag-stock contents, and in rolls or standard cut sheets.

TIME METER

For totalizing running or idle time on electrically operated machinery, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., offers the "total time meter" with four dials registering up to 9,999 hours before repeating. If desired, the meter can be mounted in the supervisor's office with connection to the machine by a single pair of wires. The 11- and 120-volt styles require approximately

1.5 watts for operation; 240 volts, 3 watts. The synchronous motor, it is stated, will stay in step with voltages 12 per cent above or below normal. Flange diameter of the unit is 3½ in.; over-all length, 3¼ in.

LIGHT SINKERS

CP-22 (dry) and CP-22W (wet) light sinkers are offered by the Chicago Pneumatic Tool Co., New York City, for shallow drilling in soft to medium formations in metal mines, quarries and coal mines, or for use in restricted quarters, maintenance work around industrial plants, flat or upward drilling or in places where the air supply is limited. Small size (over-all length, 19⅞ in.), light weight (28 or 32 lb.), low air consumption and exceptional drilling speed, rotative strength and hole-cleaning ability, considering size and

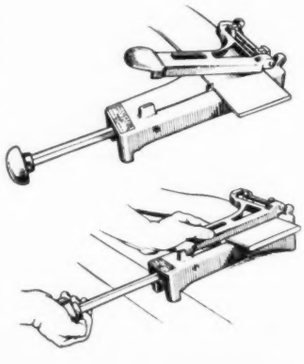
weight, are features noted by the company. Economical drilling depth is 6 to 8 ft.; size of hexagonal drill-steel shank, ⅞ to 3¼ in.

OIL-RESISTING BELT

L. H. Gilmer Co., Tacony, Philadelphia, Pa., offers a new oil-resistant belt in both V- and "Flat Kable Kord" types. Mechanically, according to the company, the belt has the same qualities as the regular Gilmer rubber-fabric. Materials used, however, are such that either type of belt is practically impervious to injury from oil.

BELT CUTTER

An 8-in. flat belt-cutting tool, designated as the "Alligator" belt cutter, is offered by the Flexible Steel Lacing Co., Chicago. The cutter functions by pushing the knife through the belt from one edge to the other. It is operated by a direct arm push, without mechanical leverage, and will cut, according to the company, even the thickest and toughest belts up to 8 in. with surprisingly little effort. The alloy-steel knife will make several thousand cuts and is easily replaceable. The belt is held immovably by the equalizing clamp, or hold-down, while



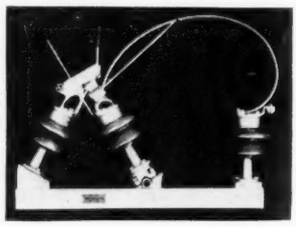
the cut is made. Weight of the cutter, which can be used either on a bench or up-ended on the floor, is 4 lb. 3 oz.

PANELBOARDS

Crouse-Hinds Co., Syracuse, N. Y., offers new Type ABD dust-tight panelboards and cabinets designed to meet the requirements of the Underwriters' Laboratories for Class II, Group G, and Class III and IV locations. The panelboards are arranged for five systems of wiring: 2- to 2-wire, 3- to 2-wire with 2-pole branch circuit breakers, 3- to 2-wire with solid neutral and single-pole branch circuit breakers, 3- to 3-wire with solid neutral and 2-pole branch circuit breakers, 4- to 2-wire, three-phase with solid neutral mains and single-phase branch circuits with single-pole circuit breakers. Cabinets are 22½ in. wide by 6½ in. deep, exclusive of handles.

SWITCHES

Delta-Star Electric Co., Chicago, offers an improved line of group-operated switches, in which the blades are equipped with an auxiliary motion giving the necessary leverage to shatter ice forma-



tions on the contacts. The interconnecting member between poles can be of steel or creosoted wood. All metal parts on the hot side of the insulator units are non-ferrous. The switches are made for 7.5- to 24.5-kv. service in accordance with NEMA standards.

COUPLING

Smith & Serrell, Newark, N. J., offer 1935 improved-type "Flexpin" couplings for which they claim increased power capacity, longer life and greater protection against shaft misalignments, shocks and vibration. The couplings are offered in 21 regular sizes for ratings up to 4,200 hp. per 100 r.p.m. and for shafts up to 13¼ in. in diameter.